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# U.S. ARMY CORPS OF ENGINEERS

## Scientific Panel's Assessment of Fish and Wildlife Mitigation Guidance



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<b>Abstract</b> Concerns have been raised by a variety of interests about the possible negative impacts that the U.S. Army Corps of Engineers construction of water resources projects may have on fish and wildlife and their habitat. Because projects such as deepening harbors and constructing dams could disturb fish and wildlife, the Corps is required to mitigate potential damage. Mitigation may include, for example, acquiring lands to replace lost habitat, creating wetlands to replace lost wetlands, and planting seedlings and other vegetation to stabilize soils and prevent erosion.		
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United States General Accounting Office  
Washington, DC 20548

May 15, 2002

The Honorable James M. Jeffords  
Chairman  
The Honorable Bob Smith  
Ranking Minority Member  
Committee on Environment and Public Works  
United States Senate

The Honorable Don Young  
Chairman  
The Honorable James L. Oberstar  
Ranking Democratic Member  
Committee on Transportation and Infrastructure  
House of Representatives

Concerns have been raised by a variety of interests about the possible negative impacts that the U.S. Army Corps of Engineers' construction of water resources projects may have on fish and wildlife and their habitat. Because projects such as deepening harbors and constructing dams could disturb fish and wildlife, the Corps is required to mitigate potential damage. Mitigation may include, for example, acquiring lands to replace lost habitat, creating wetlands to replace lost wetlands, and planting seedlings and other vegetation to stabilize soils and prevent erosion.

The Corps' Civil Works Program manages projects dealing with commercial navigation and flood damage, while its Regulatory Program oversees primarily privately financed projects that affect water and related land resources, such as residential development near a seashore. The Federal Highway Administration's Federal-aid Highway Program within the Department of Transportation oversees road construction and, like the Corps, must ensure compliance with environmental laws designed to mitigate the impact of construction on fish and wildlife. For the purposes of this report,<sup>1</sup> the five stages of a mitigation project are (1) determination—deciding whether and how much mitigation is needed; (2) design—deciding on the necessary features and performance

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<sup>1</sup> The Water Resources Development Act of 2000 (P.L. 106-541) listed four stages of mitigation: (1) design, (2) construction, (3) monitoring, and (4) evaluation. For ease of discussion, we chose to divide the design stage into determination and design stages.

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characteristics of the project, including all preconstruction activities; (3) construction—acquiring land, building structures, creating habitat, and introducing animals and plants; (4) monitoring—periodically assessing the mitigation site before, during, and after construction; and (5) evaluation—determining the success of the project, actions needed if the project is not successful and implications for improving future projects.

The Water Resources Development Act of 2000 required GAO to obtain information on the U.S. Army Corps of Engineers' efforts to mitigate for adverse impacts to fish and wildlife resources and their habitat at water resources projects since the Water Resources Development Act of 1986. In discussions with the Senate Committee on Environment and Public Works and the House Committee on Transportation and Infrastructure, we agreed to (1) determine the number of U.S. Army Corps of Engineers' civil works projects for which the Corps completed less than 50 percent of mitigation (the measure cited in the 2000 act) before starting construction and (2) establish a panel of scientific experts to compare the Corps' Civil Works Program's national guidance on fish and wildlife mitigation with mitigation guidance for the Regulatory Program and the mitigation guidance for the Federal-aid Highway Program. We selected our seven-member scientific panel on the basis of their expertise in mitigation and familiarity with the operations of these three programs. We mailed the panel members an assessment instrument and 2,500 pages of guidance documents from the three programs for their review. We asked the panel to assess the quality of each program's guidance (1) for the five stages of mitigation; (2) for five attributes—currency, clarity, completeness, breadth, and viability of the natural and man-made systems into the future; and (3) overall, taking into consideration the stages and attributes. (App. I describes our scope and methodology; app. III lists the documents reviewed; app. IV contains the assessment instrument; app. V describes the panel's assessment of the guidance; and app. VII lists the panel members and their affiliations.)

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## Results in Brief

According to the U.S. Army Corps of Engineers, 28 of the 47 water resources projects authorized since enactment of the Water Resources Development Act of 1986, that required a fish and wildlife mitigation plan, and that received construction appropriations, completed less than 50 percent of the mitigation before project construction started. Of the remaining 19 projects, 7 completed at least 50 percent of mitigation before initiating construction; 2 projects had not started construction but had done some mitigation; and 10 had not started construction or mitigation. As of September 30, 2001, of the 34 projects where construction had begun, 16 had completed 100 percent of the mitigation. Neither the 1986

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act nor subsequent Water Resources Development Acts require the Corps to complete a specific amount of mitigation before beginning to construct a project. In fact, according to the Corps, completing a specific amount of mitigation might not be feasible in some cases. For example, the Corps may need to use the material it excavates during construction to create the mitigation project, such as the material dredged from a navigation channel that is used to create wetlands.

The panel of scientific experts rated as similar the overall quality for the national fish and wildlife mitigation guidance of the Corps of Engineers' Civil Works and Regulatory Programs as well as for the Federal Highway Administration's Federal-aid Highway Program. Most panelists rated the overall quality as "moderate" or "good." The Federal-aid Highway Program, however, received more "good" ratings than the Corps' two programs. When assessing the overall quality of all three programs' guidance, some panelists indicated that the guidance was strong because of its clarity, currency, or the inclusion of ample technical guidance. Some panelists were critical, however, of the three programs' guidance. They pointed out that the programs' guidance emphasizes the determination and design stages to the detriment of the monitoring and evaluation stages; emphasizes wetlands to the detriment of other lands, such as those that have a higher elevation and tend to be drier (uplands); or fails to require corrective actions in those instances where projects do not succeed. The panelists also suggested areas for improvement: a unified body of guidance, more information on the monitoring and evaluation stages, or more discussion of uplands species and habitat. Based on the guidance alone, panelists expressed concerns about their ability to reliably estimate the percent of success that mitigation projects would have in restoring the natural hydrology and native vegetation and in supporting native fish and wildlife species. Panelists said factors other than guidance, such as major storms that are difficult to control or manage or invasive weeds or wildlife species that dominate the site unexpectedly, affect the success of mitigation projects.

The Department of Transportation reviewed the draft report and chose not to provide comments. The Department of Defense made generalized observations about the issues addressed in the report and offered specific comments on the panel's assessment of the Civil Works and Regulatory Programs' mitigation guidance. A copy of the Department of Defense's comments is included as appendix VI.

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## Background

Generally, the Congress authorizes the Corps' water resources projects every 2 years through a Water Resources Development Act. After project

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authorization, the Corps may request construction appropriations in order to initiate a project; the Congress might not appropriate construction funding for all authorized projects. The Corps uses its construction funds to support both mitigation and construction activities.

According to staff in the Corps' Civil Works Program, between the 1986 act and September 30, 2001,

- 217 water resources projects were authorized,
- 150 of these received construction appropriations,
- 103 of these 150 projects did not require a fish and wildlife mitigation plan, and
- 47 of the 150 projects required a plan.

Under the Federal-aid Highway Program, the Federal Highway Administration must ensure compliance with federal, state, and local environmental laws and regulations. The administration apportions funds to state transportation departments for planning and constructing the national highway infrastructure. State governments determine the priorities and distribute the funds.

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## Water Resources Projects Authorized Since the 1986 Act That Required a Fish and Wildlife Mitigation Plan

Of the 47 Civil Works projects authorized since the 1986 act that required a fish and wildlife mitigation plan and that received construction appropriations, 28 projects completed less than 50 percent of the mitigation before project construction began, according to the Corps.<sup>2</sup> Of the remaining 19 projects, 7 completed at least 50 percent of mitigation before initiating construction; 2 had not started construction but had done some mitigation; and 10 had not started construction or mitigation.<sup>3</sup> As of September 30, 2001, 16 of the 34 projects where construction had begun had completed 100 percent of the mitigation.

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<sup>2</sup> According to the Corps, the point at which 50 percent of mitigation is completed occurs in the fiscal year in which the Corps district office's cumulative expenditures toward the mitigation plan total at least 50 percent of the estimated cost of these activities.

<sup>3</sup> Appendix II includes more details on the 47 projects authorized since the 1986 act that received construction appropriations and required a fish and wildlife mitigation plan.

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The 1986 act requires the Corps to initiate mitigation before or concurrent with construction, but it does not specify the amount of mitigation required—nor does any subsequent Water Resources Development Act. According to the Corps, it may not complete 50 percent of the mitigation prior to initiating project construction for the following reasons:

- The proposed mitigation will occur in the construction area or when material excavated during construction is used to create the mitigation. For example, the Corps creates wetlands with material dredged from a navigation channel.
- Mitigation activities may be scheduled concurrently with construction as a logical construction sequence.
- The Corps considers “construction” to begin when it receives construction appropriations, not when it actually starts construction, even though months or years may pass between the two dates. Therefore, since construction appropriations fund both mitigation and construction activities, mitigation cannot technically begin before construction begins.

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## Scientific Panel’s Assessment of the Quality of National Fish and Wildlife Guidance, Suggested Improvements, and Estimated Success of Mitigation

The panel of scientific experts rated as similar the overall quality of the national fish and wildlife mitigation guidance for the Corps of Engineers’ Civil Works and Regulatory Programs as well as the Federal Highway Administration’s Federal-aid Highway Program. Most panelists rated the overall quality as “moderate” or “good.” The Highway Program, however, received more “good” ratings than the Corps’ two programs. In commenting on possible improvements to the guidance, the panelists suggested a unified body of guidance for the three programs, more information on the monitoring and evaluation stages, or more discussion of uplands species and habitat. Based on the guidance alone, panelists expressed concerns about their ability to reliably estimate the percent of success mitigation projects would have in restoring the natural hydrology and native vegetation and in supporting native fish and wildlife species. Panelists said factors other than guidance, such as major storms that are difficult to control or manage or invasive weeds or wildlife species that dominate the site unexpectedly, affect the success of mitigation projects.

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## Panel’s Assessment of Guidance

When asked to rate the overall quality of the collective guidance for each of the three programs, panelists generally rated it “moderate” or “good,” as

shown in table 1. The distribution of moderate and good ratings varied slightly across programs.

Table 1: Panelists’ Overall Quality Rating of the Mitigation Guidance for the Three Programs

Overall quality rating								Average rating
Program	Panelist 1	Panelist 2	Panelist 3	Panelist 4	Panelist 5	Panelist 6	Panelist 7	
Civil Works	Moderate	Good	Moderate	Moderate	Moderate	Moderate	Moderate	3.1
Regulatory	Good	Good	Moderate	Good	Moderate	Fair	Moderate	3.3
Highway	Moderate	Good	Good	Moderate	Good	Good	Good	3.7

Note: The response scale ranged from 0 to 5 (0=No Guidance, 1=Poor, 2=Fair, 3=Moderate, 4=Good, and 5=Excellent). None of the respondents rated the overall quality for any program as poor or excellent.

When assessing the quality of the three programs’ guidance collectively, some panelists indicated that the guidance was strong because of its clarity or currency, or the inclusion of ample technical guidance. Some panelists, however, were critical of the three programs’ guidance overall, noting that the guidance emphasizes the early determination and design stages to the detriment of the monitoring and evaluation stages, emphasizes wetlands to the detriment of uplands or adjacent lands, or fails to require corrective actions in those instances where projects do not succeed.

In commenting on the strengths of the Civil Work’s guidance, some panelists indicated that the guidance emphasizes an ecosystem approach and considers adjacent lands and uplands; includes a good integration of other agencies’ roles and responsibilities and the various laws and policies; or provides good technical guidance for the design, construction, and monitoring stages. The majority of panelists, however, criticized the Corps’ reliance on economic tradeoffs to determine the acceptable mitigation alternatives as presented in the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*.<sup>4</sup> Several panelists indicated that the Corps’ reliance on this guidance interferes with the current thinking, which

<sup>4</sup> The U.S. Water Resources Council originally developed these administrative guidelines in 1983 to implement the requirement of the Water Resources Planning Act that the Water Resources Council establish principles, standards, and procedures for planning water and land resources projects. According to the Corps, it developed its guidance to reflect the direction of the Water Resources Council’s guidance. Funding for the Water Resources Council ceased in fiscal year 1983 and the guidance has not been updated.

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emphasizes selecting the least damaging alternative and considering adjacent lands when determining which alternative to select. In addition, some panelists criticized the Civil Works guidance as possibly being too broad, too detailed, incomplete as it relates to determining how much and what kind of mitigation should be undertaken, lacking examples of mitigation, or not current because it does not consider mitigation activities in a landscape context.<sup>5</sup>

In assessing the strengths and weaknesses of the Corps' Regulatory Program's guidance, the panelists primarily commented on the recently issued October 2001 Regulatory Guidance Letter.<sup>6</sup> The panelists generally viewed the new guidance as an improvement over existing guidance because it

- is clearer, simpler, and more in line with current technical findings;
- strengthens the importance of watershed context<sup>7</sup> and functionality<sup>8</sup> of affected areas;
- enhances the existing guidance in the areas of determination and evaluation and places new emphasis on ecosystems rather than citing a preference for on-site in-kind mitigation;<sup>9</sup>

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<sup>5</sup> Landscape context refers to the current view of how to assure the success of mitigation projects. It includes consideration of the impact of the project to surrounding land and water areas, and vice versa.

<sup>6</sup> Regulatory Guidance Letter 01-1 on Guidance for the Establishment and Maintenance of Compensatory Mitigation Projects Under the Corps Regulatory Program Pursuant to Section 404(a) of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 (2001).

<sup>7</sup> Watershed context refers to activities and effects from throughout the entire land area drained by a stream or wetland, which could be quite extensive. In contrast, landscape context refers to a more localized impact area, usually considered what can be seen with the naked eye.

<sup>8</sup> Functionality is a focus on the natural activities and benefits provided by a resource such as a wetland; therefore, depending on the richness and concentration of those benefits, one acre of wetland could provide substantially more functionality to an ecosystem than another acre of wetland. Also, one acre of wetland could provide many more functions (wildlife, flood control, fish habitat, etc.) than another, thereby having higher functionality.

<sup>9</sup> Traditionally, mitigation projects were focused on replacing as much of the lost habitat as possible on the site and in the same form—known as on-site in-kind.

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- suggests the consideration of landscape setting and indicates a continuing evolution to a function-based approach to mitigation;<sup>10</sup>
  - is a positive step toward helping assess and quantify the amount of mitigation that is required;
  - calls for monitoring to be included as a permit condition; or
  - provides more definitive instructions on how to determine mitigation ratios<sup>11</sup> and types of mitigation, and addresses the long-term viability of mitigation through establishing success criteria.

While complimenting the new guidance, panelists also identified weaknesses. Namely, it

- still lacks the details and performance measures to truly advance wetlands protection;
- continues to need to strengthen monitoring and evaluation activities;
- still lacks sufficient specifics on how much and what type of mitigation is needed and what functions should be replaced;
- does not provide specifics on how landscape settings should be considered;
- allows credit for efforts undertaken in uplands, which means that wetlands functions and values will less likely be replaced in those situations; or

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<sup>10</sup> The function-based approach looks beyond the mere acreage of a resource, and evaluates the full range and intensity of ecosystem benefits in determining replacement requirements. Thus, one acre of high-function or multi-function wetlands might require substantially more replacement habitat than another acre of wetlands with less functionality.

<sup>11</sup> Mitigation ratios refer to the amount of replacement acreage per acre of lost resources such as wetlands. While many mitigation programs traditionally assumed a 1 to 1 ratio, the current focus on assuring the replacement of all functions, as well as widespread performance problems in constructed wetlands, has led to consideration of higher replacement ratios such as 1.5 or 2 acres of mitigation for each lost acre.

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- continues to lack guidance on the minimum requirements of a conceptual mitigation plan.

In assessing the Highway Program's guidance, panelists were generally more complimentary of its content and presentation than of the Corps' guidance. Several panelists found the guidance to

- be clearer and more focused;
- be more effective in communicating current thinking;
- be more user-friendly, with a step-by-step format;
- provide the right amount of background information and technical alternatives;
- include design options and examples;
- be stronger than the Corps' guidance in ensuring the long-run viability of the project because it calls for a compensation ratio greater than 1 to 1; or
- be more professionally presented because it allows the exercise of professional judgment.

Panelists cited few weaknesses with the Highway Program's guidance, and they did not point out the same weaknesses. For example, one panelist noted that monitoring activities involved monitoring compliance with the mitigation design rather than with measuring the functions and values<sup>12</sup> to determine replacement success. This same panelist reported that more monitoring of construction is needed because mitigation will fail because of construction flaws and not because of design problems. Another panelist found that the guidance overemphasizes the use of mitigation banks,<sup>13</sup> which may not always be appropriate.

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<sup>12</sup> Values are quantifications of the functions of resource areas such as wetlands. Functions and values are related, in that functions describe the nature of the natural assets of resources, while values describe how much of the function is present.

<sup>13</sup> A mitigation bank is an area set aside to be restored and used for mitigation for multiple projects.

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One panelist appeared to sum up the panelists' comments, stating ". . . [T]he three programs reviewed are within reach of mitigating many, but not all types of wetland habitats for fish and wildlife. . . . With modest improvements in guidance, the combined efforts of the three programs could reach a higher level of successful wetlands mitigation."

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## Suggestions for Improving Fish and Wildlife Mitigation Guidance

Panelists offered several suggestions for improving both the format and the content of the three programs' fish and wildlife mitigation guidance. In terms of format, almost all the panelists suggested the need for a single, unified body of guidance that would include both the regulatory and technical details necessary to effect successful mitigation. Doing so, according to some panelists, would improve the usability and readability of the guidance and better achieve consistency in operations and results. Among the suggested improvements, panelists recommended that the unified guidance include

- user-friendly, step-by-step instructions that tell applicants when they have to mitigate and that provide a general idea of how much mitigation will be required;
- current guidance regularly updated on a website;
- annotated outlines, more illustrations, case studies, and examples of lessons learned from past failures or successes and the reasons for them;
- a requirement for an operations, maintenance, and rehabilitation funding plan to provide greater assurance that all project services will be provided over a broad range of contingencies;
- a technically appropriate and consistent set of sampling measures applied throughout all stages of mitigation; or
- opportunities for flexibility and the exercise of professional judgment.

Regarding the content of the guidance, some panelists strongly urged that more guidance be included on the monitoring and evaluation aspects of mitigation projects. Two panelists recommended ongoing—"life cycle"—monitoring to evaluate the effectiveness of mitigation in light of explicit performance criteria and to provide a rationale for corrective action where appropriate. Some panelists suggested that the expanded monitoring and evaluation requirements should include systems to provide for feedback of

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evaluation results or that a separate budget be designated for monitoring and evaluation to ensure that adequate data be collected to determine project success.

Panelists also suggested that the content of the current guidance be expanded to more fully include discussions on uplands species and habitat other than vegetated wetlands, such as open waters, streams, or stream banks. In addition, most of the panelists suggested that the current guidance more fully discuss the functions and values and how to determine the best way to replace them. According to one panelist, once the key functions are determined, general guidance should exist on how to translate the replacement of these functions into compensation ratios and combinations of in-kind and out-of-kind<sup>14</sup> mitigation to ensure that the key functions are replaced. Another panelist suggested that permits should be denied if the functions and values will not be compensated and indicated that this requirement would decrease the likelihood of environmental degradation and increase the likelihood of successfully replacing lost functions.

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## Panel's Estimation of Achieving Successful Mitigation

We asked the panelists to estimate the percentage of success that mitigation projects could be expected to achieve in restoring the natural hydrologic conditions and native vegetation, and otherwise supporting native fish and wildlife species, under two circumstances: (1) if the present mitigation guidance were followed and (2) if the guidance were followed after being improved in the ways panelists proposed. Some panelists expressed concern in providing estimates because of (1) a lack of an empirical basis for any estimate, (2) insufficient first-hand knowledge about how closely the guidance is being followed, (3) insufficient basis for connecting success or failure with the degree to which the guidance was followed, or (4) a lack of knowledge about the competencies of the persons implementing the guidance. The panelists emphasized that any numbers provided would not be reliable, and GAO agrees.

Panelists did, however, provide insights to the primary factors, other than the guidance, that could prevent a project from restoring hydrologic

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<sup>14</sup> In-kind mitigation involves replacing the lost resource with the same kind of resource, e.g., salt marsh wetland with new or restored salt marsh wetland. Out-of-kind mitigation replaces the lost resource with a different type of resource, e.g., a salt marsh with a forested wetland.

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conditions, restoring native vegetation, and otherwise supporting native fish and wildlife species. The panel explained that project success could be affected by

- lack of experience or competence of those doing the work, or lack of proper project management;
- cost constraints or inadequate funding;
- poor site selection, poor construction, or improper implementation of design;
- lack of control and/or lack of attention to surrounding landscape conditions, or external influences from adjacent areas such as urban development, heavy infestations of exotic species, and human and animal impacts;
- unexpected conditions, such as major storms, that are difficult to control or manage or invasive weeds or wildlife species that dominate the site unexpectedly;
- inadequate monitoring for fish and wildlife values and more focus on the easier measurement of hydrology and vegetation success;
- monitoring to determine compliance with the design plan rather than monitoring functions and values, thus failing to account for poor designs;
- lack of available biological materials, such as no seed bank;
- problems in creating some types of wetlands because they are inherently difficult to replicate (peat bogs being the extreme example);
- wetlands that cover extremely small areas, or appropriate land is unavailable;
- not ensuring that corrective measures will be taken for failures in the restoration project after construction; or
- not fully restoring lost hydrology or vegetation if mitigation banks are used to compensate for losses in different watersheds.

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One panelist noted that a certain percentage of all restorations will fail in the attempt to restore native vegetation and wildlife. According to the panelist, the failure rate for “created” wetlands and other habitats is much higher than for restored sites, so it is important to distinguish the type of site being discussed. Another panelist stated that in some situations, lost functions and values are impossible to replace because of their location within the watershed, the lack of mitigation sites within the watershed, or the type of wetlands that were damaged.

A third panelist noted that, in general, restoring “natural hydrologic conditions” is only possible in “restoration” efforts (rather than “creation” or “enhancement” efforts or both), and this is only a portion of the compensation activities undertaken in these programs. According to the panelist, restoration of natural conditions is most likely to succeed when the impacts of projects occur only on the site under restoration. In all other circumstances, the panelist said, the probability of success diminishes regardless of the technical sophistication of the practitioner. Furthermore, restoring native vegetation is theoretically possible only when appropriate natural hydrologic conditions have been established. Therefore, success in this effort cannot exceed the success in hydrologic engineering. In addition, restoring native fish and wildlife species is more difficult, generally because the surrounding area has been affected, and thus the landscape setting is uncontrollably altered. In the panelist’s view, restoration of a natural community of species on compensatory mitigation sites is exceptionally difficult.

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## Views of the Agencies

We provided the Departments of Transportation and Defense with copies of the draft report for review and comment. The Department of Transportation reviewed the draft report and chose not to provide comments. The Department of Defense, in its comments, stated its view that GAO’s study has shown that the Corps met the mitigation requirements of section 906 of the Water Resources Development Act of 1986. However, we did not review or evaluate the Corps’ overall compliance with section 906 nor did we reach any conclusion in this regard. Additionally, the department clarified that for three projects identified in appendix II for which mitigation had not begun, mitigation is scheduled for later in the construction sequence because site conditions do not allow mitigation to occur earlier. We have added a footnote to the table in appendix II to reflect the Corps’ explanation.

In addition, the department raised concerns about the difficulties in comparing the fish and wildlife mitigation guidance of the three programs.

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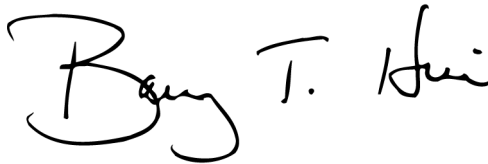
Specifically, the department pointed out that the Corps' two programs are primarily water resource development-oriented, while the Highway Program is oriented to building highways. Additionally, the department said that both the Highway and Civil Works Programs operate on a much longer timeline than the Corps' Regulatory Program and the Corps' Regulatory Program's activities are generally on a much smaller scale and rarely approach the scope of the Civil Works Program. While we agree that the focus of the three programs selected for comparison is different, we believe that the agencies' programs include similarities in that they are nationwide in scope and provide for mitigation against environmental impacts to fish and wildlife in the course of their construction activities. Additionally, our panelists did not express concern that the differences among the three programs affected their ability to assess the content and format of the three agencies' fish and wildlife mitigation guidance. A copy of the Department of Defense's detailed comments is included as appendix VI.

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We conducted our work from February 2001 through April 2002 in accordance with generally accepted government auditing standards. Details of our scope and methodology are discussed in appendix I.

We are sending copies of this report to the secretaries of defense and transportation, the principal deputy assistant secretary of the army (civil works) and the administrator, Federal Highway Administration. We will also provide copies to others on request.

If you or your staff have any questions about this report, please call me at (202) 512-3841. Key contributors to this report are listed in appendix VIII.

A handwritten signature in black ink that reads "Barry T. Hill". The signature is written in a cursive, flowing style.

Barry T. Hill  
Director, Natural Resources  
and Environment

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# Appendix I: Objectives, Scope, and Methodology

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The Water Resources Development Act of 2000 (P.L. 106-541, section 224 (b)) required GAO to obtain information on the U.S. Army Corps of Engineers' efforts to mitigate for adverse impacts on fish and wildlife resources and their habitat in the construction of its water resources projects authorized since the Water Resources Development Act of 1986. In discussions with the Senate Committee on Environment and Public Works and the House Committee on Transportation and Infrastructure, we agreed to (1) determine the number of U.S. Army Corps of Engineers' Civil Works projects for which less than 50 percent of mitigation was completed before the start of project construction and (2) establish a panel of scientific experts to compare the Corps' Civil Works Program's national guidance on fish and wildlife mitigation activities with the mitigation guidance for the Corps' Regulatory Program and with the guidance for the Federal Highway Administration's Federal-aid Highway Program.

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## Number of Corps' Projects

To determine the number of the Corps' water resources projects subject to the mitigation requirement of the 1986 act and the number of those projects not completing 50 percent of the required fish and wildlife mitigation before initiating construction, we formally requested that the Corps provide us with the following information: (1) the universe of projects authorized since the 1986 act; (2) of these authorized projects, the number for which federal construction funds were appropriated; and (3) of the authorized projects receiving federal construction funds, the number that did and did not require a fish and wildlife mitigation plan in accordance with the 1986 act. For those projects requiring a mitigation plan, we asked for the number of projects that had and had not begun construction, the number of projects that had and had not begun mitigation activities, the percentage of mitigation completed before construction began, and the percentage of mitigation completed as of September 30, 2001. We also requested that the Corps provide project-specific information, including project name, location, and purpose or type of project. The Corps solicited the information from its district offices.

The 2000 act does not define what constitutes completion of 50 percent of required mitigation. For the purposes of this report, the Senate Committee on Environment and Public Works and the House Committee on Transportation and Infrastructure asked us to request that the Corps develop its own definition. In our request to the Corps, we asked the Corps to apply this definition when obtaining the data from its district offices. The Corps defined the completion of 50 percent of required mitigation as follows:

“Construction is initiated when the first non-mitigation related construction contract is awarded. The compensatory mitigation 50-percent completion point occurs in the fiscal year that the district makes expenditures toward the mitigation plan that cumulatively total at least 50 percent of the estimated cost of these activities. The expenditures could consist of hired labor, contracts, etc., as well as lands, easements, rights-of-way, relocations, and disposal areas required for any compensatory mitigation plan identified in the feasibility report.”

Because the congressional committees asked us not to collect original data, we limited our analysis to clarifying any apparent inconsistencies in the Corps’ data with agency officials.

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## Scientific Panel’s Assessment of Fish and Wildlife Mitigation Guidance

The 2000 act requested that we assess the Corps’ Civil Works Program’s mitigation methods compared to those used in other publicly and privately financed mitigation projects and did not specifically identify the other entities. In discussions with committee staffs, we agreed that the scientific panel should review and compare the fish and wildlife mitigation guidance of these entities rather than assessing the methods. Therefore, we needed to (1) identify and select other entities undertaking mitigation activities, (2) obtain the relevant fish and wildlife mitigation guidance from the entities, and (3) establish a scientific panel of experts.

To identify which publicly and privately financed projects should be compared with the Corps’ Civil Works Program, we spoke with representatives of the Corps, the Environmental Protection Agency, the Fish and Wildlife Service, the National Marine Fisheries Service, the Bureau of Land Management, the Forest Service, the Federal Highway Administration, the Federal Aviation Administration, the Federal Transit Administration, and the National Academy of Sciences to obtain suggestions for relevant entities to select. On the basis of these discussions, we selected the Corps’ Regulatory Program and the Federal Highway Administration’s Federal-aid Highway Program for comparison to the Corps’ Civil Works Program. Both programs are national in scope and some individual construction projects undertaken could be of the same magnitude as those of the Corps’ Civil Works Program.

To obtain the fish and wildlife mitigation guidance, we spoke with representatives of the Corps’ Civil Works and Regulatory Programs, the Federal Highway Administration’s Federal-aid Highway Program, as well as the Corps’ Office of Research and Development to identify the (1) role of national and local/regional mitigation guidance in implementing the agencies’ projects, (2) types of guidance provided to program participants,

and (3) guidance the agencies considered to be the key fish and wildlife mitigation guidance. We requested that the agencies provide us with copies of key national policy, procedural, and scientific/technical guidance (including applicable models) on mitigating adverse impacts on fish and wildlife resources and their habitat. We limited our request to national guidance because both the Corps and the Federal Highway Administration rely on local districts, regions, or states to supplement the national guidance to address local environmental considerations, and the potential existed for obtaining voluminous guidance from 38 Corps districts and the 50 states. Such voluminous guidance would be unreasonable for a scientific panel to assess in a short time frame.

Initially, the agencies provided about 78 documents—or about 5,400 pages—that they considered to be key national policy, procedural, and scientific/technical guidance. Because of the complexity of the issues involved in assessing this mitigation guidance, we employed a consultant as a technical adviser. The adviser reviewed this guidance and identified documents that potentially could be excluded from the panelists' review. We met with agency representatives to seek agreement on which documents would be essential to review. From those discussions, we decided to provide the panelists a total of about 2,500 pages of guidance in the categories of (1) policy guidance applicable to all agencies, (2) technical guidance applicable to all agencies, (3) Corps' Civil Works Program guidance, (4) Corps' Regulatory Program guidance, and (5) Federal Highway Administration guidance. (See appendix III for the guidance documents the panelists reviewed.)

To establish our scientific panel of experts, we needed to identify persons who collectively would possess the necessary knowledge, skills, and experiences related to fish and wildlife mitigation and have a general knowledge of the Corps' Civil Works and Regulatory Programs and/or the Federal-aid Highway Program. The Environmental Protection Agency, the Fish and Wildlife Service, the National Marine Fisheries Service, the National Academy of Sciences, and some of our staff suggested names of potential panelists. We contacted several of the identified persons, inquired whether they had an interest in serving on the scientific panel, asked them for the names of additional persons whom we might want to consider having on the panel, and received their biographical data. Our technical adviser suggested factors to consider in developing and assessing a pool of candidates, reviewed the list of potential candidates and suggested additional names, and provided recommendations about the size and makeup of the panel. (See appendix VII for a listing of the panel members.)

To better ensure the panel's consistent assessment of the three programs' fish and wildlife mitigation guidance, we developed an assessment instrument to rate the guidance and included a series of open-ended questions that each panelist would complete. The assessment instrument asked the panelists to rate each program's guidance for five stages of a mitigation project—determination, design, construction, monitoring, and evaluation. The rating consisted of a numeric score (0 for no guidance to 5 for excellent guidance) for each of five attributes of the guidance (complete, current, clear, broad, and viable) as well as a rating for the overall quality of the guidance for each mitigation stage. For each stage, panelists provided narrative justifications for their ratings. Panelists then rated each program's collective guidance and provided a narrative summary of the strengths and weaknesses of the guidance and the relative quality of the three programs' guidance. We also asked the panelists to answer a number of open-ended questions dealing with mitigation. Before sending the assessment instrument to the panelists, we asked two mitigation experts, who were familiar with the three programs and our target population of panelists, to conduct an expert review of our assessment instrument. The experts reviewed the questionnaire for clarity, logic, and to ensure the appropriateness of the questions for the panelists.

On October 31, 2001, after we had sent the original material to the panelists, the Corps' Regulatory Program issued some new mitigation guidance. We subsequently asked the panelists to respond to questions regarding the new guidance, improvements to the mitigation guidance, and estimating the success of mitigation projects. The panelists provided their preliminary assessments, we compiled the responses, and then distributed this compilation to the panelists so they had an opportunity to review and revise their numeric and narrative responses.

We conducted our work from February 2001 through April 2002 in accordance with generally accepted government auditing standards.

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# Appendix II: Corps' 47 Projects Since the Act of 1986 with a Fish & Wildlife Mitigation Plan & Receiving Construction Appropriations

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According to the Corps of Engineers, 47 of its 217 water resources projects authorized since the Water Resources Development Act of 1986 required a fish and wildlife mitigation plan and received construction appropriations. Of these, 28 did not complete at least 50 percent of mitigation before the start of project construction. Of the remaining 19 projects, 7 completed at least 50 percent of mitigation; 2 projects had not started actual construction but had done some mitigation; and 10 projects had not started construction or mitigation as of September 30, 2001. Almost half (21) of the 47 projects are located in three states—California (10), Florida (6), and West Virginia (5). Of the 34 projects starting construction, 16 completed 100 percent of the mitigation as of September 30, 2001, according to the Corps.

Nearly half (13) of the 28 projects not completing at least 50 percent of mitigation before the start of construction were flood control projects; 11 were navigation-type projects; 3 were bluff stability-type projects; and the remaining project was an irrigation project. Some of the mitigation activities planned for these 28 projects included acquiring lands and obtaining easements; creating wetlands; planting seedlings, trees, shrubs, and other vegetation; creating artificial reefs for shore protection; and protecting slopes with stone.

**Appendix II: Corps' 47 Projects Since the Act  
of 1986 with a Fish & Wildlife Mitigation Plan  
& Receiving Construction Appropriations**

**Table II.1: Percent of Mitigation Completed for 47 Water Resources Projects Authorized Since the Water Resources Development Act of 1986 That Required a Fish and Wildlife Mitigation Plan and Received Construction Appropriations, as of September 30, 2001**

Project	State	Purpose	Construction initiated	Mitigation initiated	Percent of mitigation completed before construction initiated <sup>a</sup>	Percent of mitigation completed as of 09/30/01
<b>Projects not completing 50 percent of mitigation before construction initiated</b>						
1 Petaluma River	California	Flood Control	Yes	Yes	25	55
2 Guadalupe River	California	Flood Control	Yes	Yes	24	75
3 West Sacramento	California	Flood Control	Yes	Yes	22	24
4 Norco Bluffs	California	Flood Control	Yes	Yes	5	60
5 Olmsted Locks and Dam	Kentucky	Navigation	Yes	Yes	1	90
6 Sitka Harbor	Alaska	Navigation	Yes	Yes	0	100
7 Coyote and Berryessa Creeks	California	Flood Control	Yes	Yes	0	100
8 San Lorenzo River	California	Flood Control	Yes	Yes	0	100
9 Rio Grande	Colorado	Flood Control	Yes	Yes	0	100
10 Martin County	Florida	Shore Protection	Yes	Yes	0	100
11 Ft. Pierce Harbor	Florida	Navigation	Yes	Yes	0	100
12 Savanna Harbor Deepening	Georgia	Navigation	Yes	Yes	0	100
13 Hickman Bluff	Kentucky	Bluff Stability	Yes	Yes	0	100
14 Port Fourchon	Louisiana	Navigation	Yes	No <sup>b</sup>	0	100
15 West Columbus	Ohio	Flood Control	Yes	Yes	0	100
16 McGrath Creek	Texas	Flood Control	Yes	Yes	0	100
17 Wolf and Jordan Rivers	Mississippi	Dredging	Yes	Yes	0	90
18 Aloha-Rigolette	Louisiana	Flood Control	Yes	Yes	0	78
19 Wilmington Harbor	North Carolina	Navigation	Yes	Yes	0	75
20 Houston-Galveston Ship	Texas	Navigation	Yes	Yes	0	67
21 La. State Penitentiary	Louisiana	Flood Control	Yes	Yes	0	66
22 Palm Valley Bridge	Florida	Navigation	Yes	Yes	0	50
23 Kentucky Lock Addition	Kentucky	Navigation	Yes	Yes	0	35
24 American River Watershed	California	Flood Control	Yes	Yes	0	10
25 Ft. Pierce Beach	Florida	Shore Protection	Yes	Yes	0	10
26 Grand Prairie	Arkansas	Irrigation	Yes	No <sup>c</sup>	0	0
27 Oakland Harbor	California	Navigation	Yes	No <sup>c</sup>	0	0
28 Duck Creek	Ohio	Flood Control	Yes	No <sup>c</sup>	0	0
<b>Projects completing 50 percent or more of mitigation before construction initiated</b>						
1 Tropicana & Flamingo Washes	Nevada	Flood Control	Yes	Yes	100	100
2 Big Sioux River and Skunk Creek	South Dakota	Flood Control	Yes	Yes	100	100
3 Moorefield	West Virginia	Flood Control	Yes	Yes	100	100

**Appendix II: Corps' 47 Projects Since the Act  
of 1986 with a Fish & Wildlife Mitigation Plan  
& Receiving Construction Appropriations**

Project		State	Purpose	Construction initiated	Mitigation initiated	Percent of mitigation completed before construction initiated <sup>a</sup>	Percent of mitigation completed as of 09/30/01
4	Petersburg	West Virginia	Flood Control	Yes	Yes	100	100
5	Wood River	Nebraska	Flood Control	Yes	Yes	63	86
6	Kaweah River	California	Flood Control	No	Yes	50	78
7	Miami Harbor	Florida	Navigation	Yes	Yes	50	100
<b>Projects where some mitigation occurred but construction has not been initiated</b>							
1	Brunswick Harbor	Georgia	Navigation	No	Yes	Not applicable	3
2	Marmet Lock	West Virginia	Navigation	No	Yes	Not applicable	2
<b>Projects where neither construction nor mitigation has been initiated</b>							
1	Nogales Wash and Tributaries	Arizona	Flood Control	No	No	Not applicable	0
2	Success Dam	California	Dam Safety	No	No	Not applicable	0
3	Wares Creek	Florida	Flood Control	No	No	Not applicable	0
4	Bear Grass Creek	Kentucky	Flood Control	No	No	Not applicable	0
5	Comite River	Louisiana	Flood Control	No	No	Not applicable	0
6	Arecibo	Puerto Rico	Flood Control	No	No	Not applicable	0
7	Rio de La Plata	Puerto Rico	Flood Control	No	No	Not applicable	0
8	Upper Jordan River	Utah	Flood Control	No	No	Not applicable	0
9	Greenbrier River	West Virginia	Flood Control	No	No	Not applicable	0
10	Lower Mud River	West Virginia	Flood Control	No	No	Not applicable	0

<sup>a</sup>Is not applicable because construction has not been initiated.

<sup>b</sup>Project is self-mitigating through beneficial use of dredged material.

<sup>c</sup>Mitigation is scheduled for later in the construction sequence because site conditions do not allow mitigation to occur earlier.

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# Appendix III: Guidance Documents Reviewed by Panel

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## Governmentwide Policy Guidance

Executive Order 11990, Protection of Wetlands, (1977) [entire document].

CEQ Regulations on the National Environmental Policy Act, (1978) [entire document].

FWS mitigation policy, (1981) [entire document].

Section 404(b)(1) Guidelines, (1980) [entire document].

EPA/Corps memorandum of agreement concerning section 404(b)(1) guidelines, (1990) [entire document].

Joint FWS/NMFS/NOAA Regulations on the Endangered Species Act, [entire document].

*Memorandum: Federal Interagency Memorandum of Understanding for Implementation of the Endangered Species Act*, (1994) [entire document].

*Multi-agency Guidance on Mitigation Banking*, (1995) [entire document].

NMFS Regulations on Essential Fish Habitat, (1997) [entire document].

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## General Technical Guidance

*Wetlands Engineering Handbook*, Corps of Engineers, (2000) [paper copy and compact disc].

“EXHGM: Expert Hydrogeomorphic Approach,” Corps of Engineers’ Fact Sheet, (2000) [entire document].

“Habitat-Net: An Interactive Network for Habitat Evaluation Professionals,” Corps of Engineers’ Fact Sheet, (2000) [entire document].

“WIMS: Wildlife Information Management System,” Corps of Engineers’ Fact Sheet, (2000) [entire document].

“Erosion Control for Restoration and Environmental Benefits,” Corps of Engineers’ Fact Sheet, (2000) [entire document].

“Wildlife Habitat Restoration and Management,” Corps of Engineers’ Fact Sheet, (2000) [entire document].

*Examples of Performance Standards for Wetland Creation and Restoration in Section 404 Permits and an Approach to Developing Performance Standards*, Corps of Engineers, (1999) [entire document].

*Case Study: Application of the HGM Western Kentucky Low-Gradient Riverine Guidebook to Monitoring of Wetland Development*, Corps of Engineers, (1999) [entire document].

*Restoration of Mangrove Habitat*, Corps of Engineers, (2000) [entire document].

*Design and Construction of Docks to Minimize Seagrass Impacts*, Corps of Engineers, (1999) [entire document].

*Guidelines for Conducting and Reporting Hydrologic Assessments of Potential Wetland Sites*, Corps of Engineers, (2000) [entire document].

*Installing Monitoring Wells/Piezometers in Wetlands*, Corps of Engineers, (2000) [entire document].

*Importing Plant Stock for Wetland Restoration and Creation: Maintaining Genetic Diversity and Integrity*, Corps of Engineers, (2000) [entire document].

*Evaluating Environmental Effects of Dredged Material Management Alternatives—A Technical Framework*, EPA and Corps of Engineers, (1992) [entire document].

*Consultation Handbook for Section 7 Consultation under the Endangered Species Act*, FWS and NMFS, (1998) [Web site location: Go to <http://endangered.fws.gov> and click on “consultations” and then click on “Endangered Species Act Consultation Handbook”. The final website is <http://endangered.fws.gov/consultations/s7hndbk/s7hndbk.htm>.]

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## Corps of Engineers’ Civil Works Program Guidance

*Digest of Water Resource Policies and Authorities*, (1999) [chapters 3 and 19].

*Planning Guidance Notebook*, (2000) [chapters 1-4, appendixes C and E].

*Corps of Engineers NEPA Procedures*, (1988) [entire document].

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*Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, (1983) [pages iii-ix, 107-137].

*Cost Effectiveness Analysis for Environmental Planning: Nine EASY Steps*, (1994) [pages iii-viii and 1-10].

FWS/Corps Agreement on funding FWCA activities, (1982) [entire document].

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## Corps of Engineers' Regulatory Program Guidance

Administrative Regulations, 33 C.F.R. Parts 320, 322, 323, 325 and 330.

Regulatory Guidance Letter 93-2, on Flexibility of the 404(b)(1) Guidelines and Mitigation Banking [entire document].

Regulatory Guidance Letter 01-1 on Guidance for the Establishment and Maintenance of Compensatory Mitigation Projects Under the Corps Regulatory Program Pursuant to Section 404(a) of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, (2001) [entire document].

Standard Operating Procedures [section 18, Compensatory Mitigation].

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## Federal Highway Administration Guidance

Mitigation of Impacts to Wetlands and Natural Habitat, 23 C.F.R. Part 777, (2000) [entire document].

*Memorandum: Participation in Funding for Ecological Mitigation*, (1995) [entire document].

*Memorandum: Guidelines for the Consideration of Highway Project Impacts on Fish and Wildlife Resources*, (1989) [entire document].

*Fiscal Year 2001 Performance Plan*, (2000) [chapter 5].

*Memorandum: Financial Assurances for Wetland Mitigation Banks*, (1997) [entire document].

*Memorandum: Eligibility of "Historic Wetlands" for ISTEA Funding*, (1997) [entire document].

*Memorandum: Use of Private Wetland Mitigation Banks as Compensatory Mitigation for Highway Project Impacts*, (1995) [entire document].

*Memorandum: Funding for Establishment of Wetland Mitigation Banks*, (1994) [entire document].

*Memorandum: Wetland Delineation and Mitigation*, (1994) [entire document].

DOT Order 5660.1A, Preservation of the Nation's Wetlands, (1978) [entire document].

*NCHRP Report 379: Guidelines for the Development of Wetland Replacement Areas*, Transportation Research Board, National Research Council, (1996) [entire document].

*Applying the Section 404 Permit Process to Federal-Aid Highway Projects*, FHWA, COE, EPA, FWS, NOAA, (1988) [entire document].

*Highways and Wetlands: Compensating Wetlands Losses*, (1986) [entire document].

# Appendix IV: Assessment Instrument Used by Panel



United States General Accounting Office

## Evaluation of Guidance on Mitigating Fish and Wildlife Impacts

### Introduction

The U.S. General Accounting Office, an independent agency of the Congress, is authorized by the Water Resources Development Act of 2000 to review and report on the quality of the guidance used in the U.S. Army Corps of Engineers' (Corps) Civil Works Program for mitigating losses of fish and wildlife. As part of this effort, GAO is consulting with a panel of experts to compare the guidance on mitigating the losses to fish and wildlife that is available for the following three federal programs: the Corps' Civil Works Program, the Corps' Regulatory Program and the Federal Highway Administration's Federal-Aid Highway Program. As you know, you are one of the experts who have agreed to serve on that panel.

### Panel Responses

Panelists will be expected to rate the guidance for the three programs. We recommend that you spend several hours reviewing the binders of guidance. First, after reviewing the agencies' guidance, panelists will assess—for each program—five attributes (complete, current, clear, broad, and viable) and an overall rating considering all five attributes. This assessment will be for each stage of a mitigation project—determination, design, construction, monitoring, and evaluation. Panelists will record these numeric ratings on the answer form for question 1. The summary numeric rating assessing the quality of the guidance for all attributes at all stages should be provided on the answer form for question 3. In determining the specific numeric rating (0 for no guidance to 5 for excellent), panelists should review the considerations listed in appendix A for each attribute and for each stage of a mitigation project. The considerations should serve as a starting point, but not a comprehensive set of considerations.

Secondly, for question 2, panelists will be expected to provide a narrative that supports the overall

ratings for each of the mitigation stages. As part of this effort, panelists could explain the rating for certain attributes of a stage of a mitigation project or why a certain program was given a certain rating. Providing references or citations to specific documents would be helpful. Our final report will present the results of these assessments. These narrative explanations should be included in hardcopy or preferably on the computer diskette provided (file name "responses.doc").

Thirdly, in question 4, panelists will be expected to provide a supporting narrative for the summary ratings in question 3 that considers collectively each of the five attributes and each of the mitigation stages. This narrative should present the panelist's summary assessment of the strengths and weaknesses of the guidance and the relative quality of the three programs' guidance. We are requesting that you provide references or citations to specific documents in your narrative responses. In question 5, panelists are being asked to provide their opinion on whether implementation of the mitigation guidance would result in restoration of natural hydrologic conditions and native vegetation and support native fish and wildlife species. Our final report will present the results. The narrative explanations should be included in hardcopy or preferably on the computer diskette provided (file name "responses.doc").

Finally, for questions 6 and 7, panelists will be expected to answer two specific questions on the guidance of the three programs. These narrative explanations should be included in hardcopy or preferably on the computer diskette provided (file name "responses.doc").

### Documents Provided

The carton that accompanies this letter contains binders with several hundred pages of documents about mitigation guidance. The materials come under the following general headings:

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**Appendix IV: Assessment Instrument Used by  
Panel**

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I: GOVERNMENTWIDE POLICY  
GUIDANCE  
II: GENERAL TECHNICAL GUIDANCE  
III: CORPS' CIVIL WORKS PROGRAM  
GUIDANCE  
IV: CORPS' REGULATORY PROGRAM  
GUIDANCE  
V: FEDERAL HIGHWAY  
ADMINISTRATION'S GUIDANCE

Appendix B lists all documents contained in the binders. Appendix C is a shorter version of appendix B, listing key documents by stage of mitigation and providing page numbers or chapters within those documents that you should use as a starting point for completing the ratings in question 1. However, you should refer to the larger set of documents to provide a broader and complete perspective when answering question 1.

In accordance with our contract, your completed questionnaire and any electronic files must be submitted in the enclosed pre-addressed, postage-paid envelope by November 7, 2001. In the event the envelope is misplaced, the return address is:

U.S. General Accounting Office  
Ms. Linda Harmon  
441 G Street, NW, Room 2T23A  
Washington, DC 20548

If you have technical questions related to the stages of mitigation, the attributes of the guidance, or the considerations in appendix A, please contact Bill Matuszeski at 202-544-2691, [bmat@olg.com](mailto:bmat@olg.com). If you have any general questions, please contact either Posey McCarthy at (202) 512-4916, [mccarthyr@gao.gov](mailto:mccarthyr@gao.gov) or Linda Harmon at (202) 512-8046, [harmonl@gao.gov](mailto:harmonl@gao.gov).

**Appendix IV: Assessment Instrument Used by Panel**

1. How do you rate each attribute of the guidance for each of the five mitigation stages? *(Give a separate rating for each attribute on each of the five stages. Record your answers to this question in the grid below.)* 0 No guidance, 1 Poor, 2 Fair, 3 Moderate, 4 Good or 5 Excellent

Stage of Mitigation Project	Attributes of Mitigation Guidance					
	Complete: How do you rate the completeness of the guidance? (i.e., designation of tasks and responsibilities; range of mitigation alternatives; inclusion of examples and cross-references; discussion of quality control, feedback, reporting; measures of success)			Current: How do you rate the guidance for being up-to-date? (i.e., reflects current laws and regulations and up-to-date technical knowledge.)		
	Corps Civil Works	Corps Regulatory	FHWA	Corps Civil Works	Corps Regulatory	FHWA
<b>DETERMINATION Stage:</b> This is the stage when a determination is made of (a) whether compensatory mitigation is required for project impacts, and (b) the amount of mitigation.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>DESIGN Stage:</b> This includes all pre-construction guidance once the decision on the need and extent of compensatory mitigation has been made. It should include both policy and technical guidance with respect to the necessary features and performance characteristics of the mitigation project.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>CONSTRUCTION Stage:</b> This includes land acquisition as well as all activity on the site of the mitigation project, and the timing and other relationships with respect to the project creating the need for mitigation. The application of the guidance to all entities that have roles in construction of the mitigation project also needs to be considered.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>MONITORING Stage:</b> This includes monitoring of the mitigation site before, during, and after construction. Monitoring guidance should establish the extent of federal agency responsibility and should be clear about its applicability to others involved in the mitigation project.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>EVALUATION Stage:</b> This includes three elements: (1) determining the overall effectiveness and success of the mitigation project; (2) determining what to do if a project is shown by the monitoring program, or otherwise, not to be a complete success; and (3) determining the implications for improving future mitigation projects.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance

**Appendix IV: Assessment Instrument Used by Panel**

Stage of Mitigation Project	Attributes of Mitigation Guidance					
	<b>Clear:</b> How do you rate the clarity of the guidance? (i.e., clear on duties, responsibilities, distinction between required and discretionary actions, logical organization of information)			<b>Broad:</b> How broad is the scope of the mitigation impacts addressed by the guidance? (i.e., hydrology, vegetation, fish and wildlife species, adjacent lands, wetlands)		
	Corps Civil Works	Corps Regulatory	FHWA	Corps Civil Works	Corps Regulatory	FHWA
<b>DETERMINATION Stage:</b> This is the stage when a determination is made of (a) whether compensatory mitigation is required for project impacts, and (b) the amount of mitigation.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>DESIGN Stage:</b> This includes all pre-construction guidance once the decision on the need and extent of compensatory mitigation has been made. It should include both policy and technical guidance with respect to the necessary features and performance characteristics of the mitigation project.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>CONSTRUCTION Stage:</b> This includes land acquisition as well as all activity on the site of the mitigation project, and the timing and other relationships with respect to the project creating the need for mitigation. The application of the guidance to all entities that have roles in construction of the mitigation project also needs to be considered.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>MONITORING Stage:</b> This includes monitoring of the mitigation site before, during, and after construction. Monitoring guidance should establish the extent of federal agency responsibility and should be clear about its applicability to others involved in the mitigation project.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>EVALUATION Stage:</b> This includes three elements: (1) determining the overall effectiveness and success of the mitigation project; (2) determining what to do if a project is shown by the monitoring program, or otherwise, not to be a complete success; and (3) determining the implications for improving future mitigation projects.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance

**Appendix IV: Assessment Instrument Used by Panel**

Stage of Mitigation Project	Attributes of Mitigation Guidance					
	Viable: How do you rate the guidance in addressing the long-term viability of the ecosystems? (i.e., survivability of natural and man-made systems into the distant future)			Overall quality: How do you rate the overall quality of the guidance for fish and wildlife mitigation at this stage?		
	Corps Civil Works	Corps Regulatory	FHWA	Corps Civil Works	Corps Regulatory	FHWA
<b>DETERMINATION Stage:</b> This is the stage when a determination is made of (a) whether compensatory mitigation is required for project impacts, and (b) the amount of mitigation.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>DESIGN Stage:</b> This includes all pre-construction guidance once the decision on the need and extent of compensatory mitigation has been made. It should include both policy and technical guidance with respect to the necessary features and performance characteristics of the mitigation project.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>CONSTRUCTION Stage:</b> This includes land acquisition as well as all activity on the site of the mitigation project, and the timing and other relationships with respect to the project creating the need for mitigation. The application of the guidance to all entities that have roles in construction of the mitigation project also needs to be considered.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>MONITORING Stage:</b> This includes monitoring of the mitigation site before, during, and after construction. Monitoring guidance should establish the extent of federal agency responsibility and should be clear about its applicability to others involved in the mitigation project.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance
<b>EVALUATION Stage:</b> This includes three elements: (1) determining the overall effectiveness and success of the mitigation project; (2) determining what to do if a project is shown by the monitoring program, or otherwise, not to be a complete success; and (3) determining the implications for improving future mitigation projects.	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance	5 Excellent 4 Good 3 Moderate 2 Fair 1 Poor 0 No guidance

**Open-ended Questions: Narrative Explanations**

2. After considering all the factors that led to your overall quality rating of the guidance documents at each stage, please compare and contrast the quality of the guidance documents for the Corps' Civil Works Program to the guidance documents for both the Corps' Regulatory Program and the Federal Highway Administration's Federal-Aid Highway Program. What are the primary factors that you considered in rating the guidance for each of the mitigation stages in Question 1? In your response, please provide justification for your rating on the attributes (e.g., complete, current, clear, broad, and viable) that influenced your overall rating of the quality of the guidance documents for each stage.

A. DETERMINATION Stage:

B. DESIGN Stage:

C. CONSTRUCTION Stage:

D. MONITORING Stage:

E. EVALUATION Stage:

**Summary Rating**

3. What is your single summary rating of the guidance provided for each program for mitigating the losses of fish and wildlife and associated habitat? *(Please circle one number for each program and return to GAO along with Question 1 answer form.)*

Summary rating of guidance for mitigating losses of fish, wildlife and associated habitat:		
Corps' Civil Works Program	Corps' Regulatory Program	FHWA Program
5 Excellent	5 Excellent	5 Excellent
4 Good	4 Good	4 Good
3 Moderate	3 Moderate	3 Moderate
2 Fair	2 Fair	2 Fair
1 Poor	1 Poor	1 Poor

4. What aspects of each program's guidance were most important in determining the differences and similarities of your summary ratings in Question 3? In your response, consider the quality of the guidance documents for each program as they relate to the various attributes—complete, current, clear, broad, and viable. Please include any other considerations that led to your summary rating. *(Provide a complete explanation in the electronic file on the diskette provided.)*
5. The Water Resources Development Act of 2000 requests that GAO examine the extent to which mitigation projects restore natural hydrologic conditions, restore native vegetation, and otherwise support native fish and wildlife species. In your opinion, if you followed the guidance for each of the three programs, would the mitigation projects restore natural hydrologic conditions, restore native vegetation, and otherwise support native fish and wildlife species? Please explain the basis for your response.
6. The Corps' Civil Works Program relies on the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)* (tab P in the binder entitled "Corps Civil Works Program Guidance") as a part of the Corps' project construction determination. Unlike the *Planning Guidance Notebook*, the *P&G* establishes a trade-off between economic and environmental benefits. Does reliance on the *P&G* interfere with current thinking with respect to the Civil Works Program's approach to fish and wildlife mitigation? *(Provide a complete explanation in the electronic file on the diskette provided.)*
7. The two Corps of Engineers' programs each rely heavily on a single document for nationwide guidance—the *Planning Guidance Notebook* (tab N in the binder entitled "Corps Civil Works Program Guidance") for the Civil Works Program and the Administrative Regulations (tab T in the binder entitled "Corps Regulatory Program Guidance") for the Regulatory Program. The FHWA guidance is less centralized and more issue-specific. Is one approach more effective than the other with respect to mitigation guidance? Is each approach appropriate to the nature of the program it applies to? *(Provide a complete explanation in the electronic file on the diskette provided.)*
8. On October 31, 2001, the Corps' Regulatory Program issued new guidance in response to the National Research Council's June 2001 report. Considering the five stages of mitigation—determination, design, construction, monitoring, and evaluation—and the six attributes of the guidance—complete, current, clear, broad, viable, and overall quality—and your previous responses to questions 1 to 7, please assess the new guidance (*Guidance for the Establishment and Maintenance of Compensatory Mitigation Projects Under the Corps Regulatory Program Pursuant to Section 404 (a) of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899*) and answer the following two questions:
  - Does the new guidance enhance any of the strengths of the previously reviewed Corps' Regulatory Program guidance, correct any of the previous weaknesses identified, conflict with existing guidance, or leave unanswered some of the issues you previously identified during your review? Please explain.
  - If you initially had this guidance as part of the documents from the Corps' Regulatory Program, would you have modified any of your narrative or numeric scores? If so, which ones and why?

**Appendix IV: Assessment Instrument Used by Panel**

9. A number of panelists remarked favorably that the Corps Civil Works program guidance takes an ecosystem-based approach to mitigation. Other panelists criticized all three programs for failing to deal effectively with adjacent lands and offsite impacts. Please more fully explain your position on this issue to help us better understand these evidently divergent views.
10. Intertwined among the panelists' responses were a number of suggestions to improve the mitigation guidance for the three programs. Please identify your top three proposals for change. These proposals may be program-specific or more general.
11. In your opinion, what is a reliable estimate of the percentage of success that mitigation projects could be expected to achieve in (a) restoring the natural hydrologic conditions, (b) restoring native vegetation, and (c) otherwise supporting native fish and wildlife species, under the following three situations: (1) "Business as usual" implementation of present guidance (e.g., present guidance followed to the extent it is currently followed); (2) if the present guidance were actually followed; and (3) if the guidance were followed after being improved in the ways you and the other panelists have proposed?

NOTE: Estimate percentages across all projects for which you can judge, and take into account any other factors, such as site characteristics, professional qualifications of planners, quality of contract execution, policy constraints, legal constraints, resource limitations, cost/benefit trade-offs, etc., that might affect outcomes.

If you feel that you are not able to give a reliable estimate, enter "NA" in the answer space(s) and explain in Question 13 below.

Program	Outcomes	Estimated percentage of success to be achieved (Enter "NA" if you cannot make a reliable estimate.)		
		"Business as usual" implementation	If present guidance followed	If improved guidance followed
Corps Civil Works	Restore natural hydrologic conditions			
	Restore native vegetation			
	Otherwise support native fish and wildlife species			
Corps Regulatory	Restore natural hydrologic conditions			
	Restore native vegetation			
	Otherwise support native fish and wildlife species			
Federal Highway Administration	Restore natural hydrologic conditions			
	Restore native vegetation			
	Otherwise support native fish and wildlife species			

12. Where you feel elaboration might be helpful, please briefly explain your rationale for your percentage estimates above.

13. What factors prevent you from providing a reliable estimate of the percentages in Question 11?  
(Answer only if you marked "NA" in one or more of the cells in the table above to indicate that you could not make a reliable estimate.)

14. What are the primary factors, other than the guidance, that could prevent a project from restoring natural hydrologic conditions, restoring native vegetation, and otherwise supporting native fish and wildlife species? (Answer only if any of the answers in Question 11 are less than 100% or are "NA".)

**APPENDIX A: CONSIDERATIONS FOR EVALUATING QUALITY OF  
MITIGATION GUIDANCE**

Stage of Mitigation Project	<b>COMPLETE:</b> How do you rate the completeness of the guidance? (i.e., designation of tasks and responsibilities; range of mitigation alternatives; inclusion of examples and cross-references; discussion of quality control, feedback, reporting; measures of success)	<b>CURRENT:</b> How do you rate the guidance for being up-to-date? (i.e., reflects current laws and regulations and up-to-date technical knowledge.)
<b>DETERMINATION Stage:</b> This is the stage when a determination is made of (a) whether compensatory mitigation is required for project impacts, and (b) the amount of mitigation.	Consider whether the guidance: <ul style="list-style-type: none"> <li>covers the range of circumstances in which mitigation requirements might reasonably arise.</li> <li>covers the amount of required mitigation.</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>demonstrates consistency with current statutory and regulatory requirements for mitigating fish and wildlife and associated habitat losses.</li> <li>includes the most current technical developments that affect the need and extent of mitigation.</li> </ul>
<b>DESIGN Stage:</b> This includes all pre-construction guidance once the decision on the need and extent of compensatory mitigation has been made. It should include guidance with respect to the necessary features and performance characteristics of the mitigation project.	Consider whether the guidance: <ul style="list-style-type: none"> <li>provides essentially all parameters needed to design effective mitigation projects.</li> <li>provides adequate examples of good design and information about successes and failures or lessons learned, <ul style="list-style-type: none"> <li>OR (if previous two not included)</li> </ul> </li> <li>provides adequate cross-references to other documents or sources.</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>reflects the most recent analyses of the effectiveness of mitigation projects.</li> <li>provides a means to access the latest updated information on effectiveness.</li> <li>evaluates recent experiences with mitigation projects both within and outside the agency.</li> <li>indicates how such results should affect design decisions.</li> </ul>
<b>CONSTRUCTION Stage:</b> This includes land acquisition as well as all activity on the site of the mitigation project, and the timing and other relationships with respect to the project creating the need for mitigation. The application of the guidance to all entities that have roles in construction of the mitigation project also needs to be considered.	Consider whether the guidance: <ul style="list-style-type: none"> <li>covers all aspects of construction, from site acquisition to turnover of the completed mitigation project.</li> <li>applies to all persons and entities, federal and nonfederal, involved in the project.</li> <li>provides performance standards for the completed project, <ul style="list-style-type: none"> <li>OR</li> </ul> </li> <li>cross-references to other documents and sources.</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>discusses recent lessons learned from building similar types of mitigation projects.</li> <li>reflects successes and failures of mitigation projects.</li> <li>describes the latest technologies authorized.</li> <li>contains instruction on how to access and include updated information.</li> </ul>

**Appendix IV: Assessment Instrument Used by  
Panel**

Stage of Mitigation Project	<b>COMPLETE:</b> How do you rate the completeness of the guidance? (i.e., designation of tasks and responsibilities; range of mitigation alternatives; inclusion of examples and cross-references; discussion of quality control, feedback, reporting; measures of success)	<b>CURRENT:</b> How do you rate the guidance for being up-to-date? (i.e., reflects current laws and regulations and up-to-date technical knowledge.)
<b>MONITORING Stage:</b> This includes monitoring of the mitigation site before, during, and after construction. Monitoring guidance should establish the extent of federal agency responsibility and should be clear about its applicability to others involved in the mitigation project.	Consider whether the guidance: <ul style="list-style-type: none"> <li>requires monitoring for the mitigation project.</li> <li>requires quality and other reporting procedures.</li> <li>specifies the parameters of the monitoring program and who does the monitoring and to whom the monitoring is reported.</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>provides the latest information about monitoring techniques to those responsible for carrying out the monitoring.</li> <li>includes information on monitoring activities that are most useful in measuring the success level of mitigation projects, OR</li> <li>guidance should provide cross-references to other documents or sources.</li> <li>allows for the program to bear added costs related to monitoring techniques that it is learned will be more effective.</li> </ul>
<b>EVALUATION Stage:</b> This includes three elements: (1) determining the overall effectiveness and success of the mitigation project; (2) determining what to do if a project is shown by the monitoring program, or otherwise, not to be a complete success; and (3) determining the implications for improving future mitigation projects.	Consider whether the guidance: <ul style="list-style-type: none"> <li>requires evaluation.</li> <li>includes the critical aspects for measuring the success of mitigation.</li> <li>includes corrective action steps.</li> <li>requires feedback mechanisms to ensure that mistakes are not repeated in future mitigation projects.</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>includes the most current approaches for evaluating the effectiveness of constructing what are essentially natural systems.</li> <li>contains concepts of functional equivalency and ecosystem stability that are reflective of the extensive experiences in recent years with mitigation projects.</li> </ul>

**Appendix IV: Assessment Instrument Used by Panel**

Stage of Mitigation Project	<b>CLEAR:</b> How do you rate the clarity of the guidance? (i.e., clear on duties, responsibilities, distinction between required and discretionary actions, logical organization of information.)	<b>BROAD:</b> How broad is the scope of the mitigation impacts addressed by the guidance? (i.e., hydrology, vegetation, fish and wildlife species, adjacent lands, wetlands.)
<b>DETERMINATION Stage:</b> This is the stage when a determination is made of (a) whether compensatory mitigation is required for project impacts, and (b) the amount of mitigation.	Consider whether the guidance: <ul style="list-style-type: none"> <li>• leaves no doubt when mitigation is required and how much must be done.</li> <li>• contains an organized set of procedures that lead to the mitigation decision.</li> <li>• specifies when discretion may be exercised, and establishes the limits of discretion and the points in the process where it is exercised.</li> <li>• clearly states who exercises discretion.</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>• contains mitigation requirements that apply to a wide range of natural systems.</li> <li>• addresses required mitigation beyond wetlands to other aspects of fish and wildlife and associated habitat.</li> <li>• indicates that mitigation projects are required to consider losses beyond wetlands.</li> <li>• includes consideration of the impact of adjacent lands on the mitigation project and vice versa.</li> </ul>
<b>DESIGN Stage:</b> This includes all pre-construction guidance once the decision on the need and extent of compensatory mitigation has been made. It should include guidance with respect to the necessary features and performance characteristics of the mitigation project.	Consider whether the guidance: <ul style="list-style-type: none"> <li>• sets out a logical approach to mitigation project design.</li> <li>• provides user with specific design criteria and demonstrates how the criteria should be applied.</li> <li>• is at the appropriate level for users who will need to make design decisions.</li> <li>• clearly provides the range of options and the areas of discretion.</li> <li>• clearly states who should make the design decisions.</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>• includes design elements to deal with loss of fish and wildlife species, as well as restoration of hydrology, native vegetation and non-wetlands habitat.</li> <li>• includes design measures related to impacted uplands and interests in such lands as they relate to design of mitigation projects.</li> </ul>
<b>CONSTRUCTION Stage:</b> This includes land acquisition as well as all activity on the site of the mitigation project, and the timing and other relationships with respect to the project creating the need for mitigation. The application of the guidance to all entities that have roles in construction of the mitigation project also needs to be considered.	Consider whether the guidance: <ul style="list-style-type: none"> <li>• provides an organized set of procedures guiding construction steps.</li> <li>• supplies answers to questions that may arise during construction.</li> <li>• identifies and addresses timing and other construction aspects related to the project that causes the loss of resources.</li> <li>• lays out the range of construction options and the areas of discretion.</li> <li>• specifies who has responsibility for constructing the mitigation project.</li> <li>• discusses agency controls to ensure on-time delivery.</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>• covers mitigation projects for aquatic resources.</li> <li>• discusses restoring natural hydrology and native vegetation.</li> <li>• covers mitigation projects for terrestrial resources.</li> </ul>

**Appendix IV: Assessment Instrument Used by  
Panel**

Stage of Mitigation Project	<b>CLEAR:</b> How do you rate the clarity of the guidance? (i.e., clear on duties, responsibilities, distinction between required and discretionary actions, logical organization of information.)	<b>BROAD:</b> How broad is the scope of the mitigation impacts addressed by the guidance? (i.e., hydrology, vegetation, fish and wildlife species, adjacent lands, wetlands.)
<b>MONITORING Stage:</b> This includes monitoring of the mitigation site before, during, and after construction. Monitoring guidance should establish the extent of federal agency responsibility and should be clear about its applicability to others involved in the mitigation project.	Consider whether the guidance: <ul style="list-style-type: none"> <li>contains a set of procedures for monitoring the effectiveness of the mitigation project.</li> <li>establishes a program to utilize monitoring data.</li> <li>assigns duties and responsibilities for monitoring programs.</li> <li>establishes protocols for implementing monitoring, and for documenting the outcomes.</li> <li>specifies who has responsibility for reviewing the monitoring reports</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>includes coverage of the most important measures of success of a mitigation project.</li> <li>requires the examination of off-site impacts.</li> <li>requires monitoring of vegetation, fish and wildlife species, and hydrology.</li> </ul>
<b>EVALUATION Stage:</b> This includes three elements: (1) determining the overall effectiveness and success of the mitigation project; (2) determining what to do if a project is shown by the monitoring program, or otherwise, not to be a complete success; and (3) determining the implications for improving future mitigation projects.	Consider whether the guidance: <ul style="list-style-type: none"> <li>establishes an evaluation process for judging the success of mitigation projects.</li> <li>indicates who is responsible for evaluating mitigation projects, when the evaluation should be done, and what are the implications of findings, both for the project evaluated and for future projects.</li> <li>specifies the range of options and areas of discretion for evaluation</li> <li>establishes criteria for which mitigation projects are evaluated.</li> </ul>	Consider whether the guidance: <ul style="list-style-type: none"> <li>requires that projects be evaluated for the full range of benefits they are intended to provide.</li> <li>specifies whether benefits include such aspects as hydrology, vegetation, and fish and wildlife species.</li> <li>includes the effects on natural systems in surrounding land and water areas as part of the evaluation.</li> </ul>

**Appendix IV: Assessment Instrument Used by Panel**

Stage of Mitigation Project	<b>VIABLE:</b> How do you rate the guidance in addressing the long-term viability of the ecosystems? (i.e., survivability of natural and man-made systems into the distant future.)	<b>OVERALL QUALITY:</b> How do you rate the overall quality of the guidance for fish and wildlife mitigation at this stage?
<b>DETERMINATION Stage:</b> This is the stage when a determination is made of (a) whether compensatory mitigation is required for project impacts, and (b) the amount of mitigation.	Consider whether the guidance: <ul style="list-style-type: none"> <li>establishes responsibility for ensuring that the mitigation is successful and adequately replaces the loss of resources and natural functions.</li> <li>accounts for variables affecting the risk of success and long-term viability.</li> <li>provides for required reconsideration of the proposed Corps or highway project if evidence exists that the required mitigation project is not viable.</li> </ul>	Taking all the above into account, and using your judgment to weigh the relative importance of the five attributes, how would you rate the guidance overall with respect to determining the need and extent of mitigation for fish and wildlife and associated habitat impacts of projects?
<b>DESIGN Stage:</b> This includes all pre-construction guidance once the decision on the need and extent of compensatory mitigation has been made. It should include guidance with respect to the necessary features and performance characteristics of the mitigation project.	Consider whether the guidance: <ul style="list-style-type: none"> <li>addresses the long-term survival of the natural systems in mitigation projects.</li> <li>includes criteria and standards expressed in terms of survival times and stable natural systems.</li> <li>includes interventions to deal with failures.</li> <li>provides for opportunities to minimize the cost and extent of required maintenance.</li> </ul>	Taking all the above into account, and using your judgment to weigh the relative importance of the five attributes, how would you rate the guidance overall with respect to the treatment of the design of projects for mitigation of fish and wildlife and associated habitat losses associated with projects?
<b>CONSTRUCTION Stage:</b> This includes land acquisition as well as all activity on the site of the mitigation project, and the timing and other relationships with respect to the project creating the need for mitigation. The application of the guidance to all entities that have roles in construction of the mitigation project also needs to be considered.	Consider whether the guidance: <ul style="list-style-type: none"> <li>addresses the need to construct mitigation projects so that naturally sustainable ecosystems are put in place.</li> <li>discusses the concern that natural resources affected by construction should be treated in ways that will maximize their survivability.</li> <li>contains standards and expectations with respect to the longevity of the project.</li> </ul>	Taking all the above into account, and using your judgment to weigh the relative importance of the five attributes, how would you rate the guidance overall with respect to the treatment of the construction of projects for mitigation of fish and wildlife and associated habitat losses?

**Appendix IV: Assessment Instrument Used by  
Panel**

Stage of Mitigation Project	<b>VIABLE:</b> How do you rate the guidance in addressing the long-term viability of the ecosystems? (i.e., survivability of natural and man-made systems into the distant future.)	<b>OVERALL QUALITY:</b> How do you rate the overall quality of the guidance for fish and wildlife mitigation at this stage?
<b>MONITORING Stage:</b> This includes monitoring of the mitigation site before, during, and after construction. Monitoring guidance should establish the extent of federal agency responsibility and should be clear about its applicability to others involved in the mitigation project.	Consider whether the guidance: <ul style="list-style-type: none"> <li>requires the monitoring needed to ensure long-term success of the mitigation project.</li> <li>establishes a time limit for the monitoring program and if so, ensures that viability will be proven within the monitoring timeframe.</li> <li>provides the basis for determining how long the monitoring should continue.</li> </ul>	Taking all the above into account, and using your judgment to weigh the relative importance of the five attributes, how would you rate the guidance overall with respect to the treatment of the monitoring of projects for mitigation of fish and wildlife and associated habitat losses?
<b>EVALUATION Stage:</b> This includes three elements: (1) determining the overall effectiveness and success of the mitigation project; (2) determining what to do if a project is shown by the monitoring program, or otherwise, not to be a complete success; and (3) determining the implications for improving future mitigation projects.	Consider whether the guidance: <ul style="list-style-type: none"> <li>is sufficiently focused on the sustainability of the natural systems being created.</li> <li>specifies assumptions for projecting into the future conditions at the time of the evaluation.</li> </ul>	Taking all the above into account, and using your judgment to weigh the relative importance of the five attributes, how would you rate the guidance overall with respect to the treatment of the evaluation of projects for mitigation of fish and wildlife and associated habitat losses?

# Appendix V: Panel of Scientific Experts’ Assessment of Fish & Wildlife Mitigation Guidance by Attribute & Stage of Mitigation

The panel of scientific experts was tasked with comparing the Corps of Engineers’ Civil Works Program’s, the Corps’ Regulatory Program’s, and the Federal Highway Administration’s Federal-aid Highway Program’s national fish and wildlife mitigation guidance. In assessing this guidance, the panel was to focus on various attributes of the guidance and the five stages of a mitigation project.<sup>1</sup> The panel provided numeric ratings ranging from “0” for no guidance, “1” for poor guidance, “2” for fair guidance, “3” for moderate guidance, “4” for good guidance, to “5” for excellent guidance for the various mitigation stages. Summaries of the panelists’ numeric and narrative responses follow.

Table V.1 Summary of Expert Panel’s Final Assessment of the Corps of Engineers’ and Federal Highway Administration’s Fish and Wildlife Mitigation Guidance						
Stages of Mitigation Projects	Attributes					Overall rating
	Complete	Current	Clear	Broad	Viable	
<b>Determination</b>						
Civil Works Program	3.1	3.4	3.3	3.0	2.4	3.3
Regulatory Program	3.3	3.4	3.4	2.7	2.4	3.1
Highway Program	3.1	3.3	3.6	3.6	3.0	3.6
<b>Design</b>						
Civil Works Program	3.6	3.7	3.4	2.9	3.6	3.4
Regulatory Program	3.6	3.7	3.9	3.0	3.6	3.6
Highway Program	4.1	3.7	4.1	3.6	3.6	3.7
<b>Construction</b>						
Civil Works Program	3.3	3.4	3.4	3.1	3.6	3.6
Regulatory Program	3.4	3.3	3.6	3.6	3.7	3.7
Highway Program	4.0	4.0	4.1	4.0	3.9	4.1
<b>Monitoring</b>						
Civil Works Program	3.6	3.4	3.0	3.1	2.9	3.1
Regulatory Program	3.6	3.4	3.3	3.1	3.0	3.0
Highway Program	3.7	3.7	3.6	3.6	3.3	3.6
<b>Evaluation</b>						
Civil Works Program	2.0	2.7	2.6	2.1	1.9	1.9
Regulatory Program	2.4	2.7	2.7	2.3	2.4	2.3
Highway Program	2.7	3.0	3.1	2.9	2.9	2.7

<sup>1</sup> While the law only included project design, construction, monitoring, and evaluation stages of a mitigation project, we subdivided the project design stage to separate the guidance that focuses on how the decision is made that fish and wildlife mitigation is required, and if so, how much, and how the project is actually designed to address the need for fish and wildlife mitigation.

Stages of Mitigation Projects			Attributes			Overall rating
			Complete	Current	Clear	
Overall Rating						
Civil Works Program						3.1
Regulatory Program						3.3
Highway Program						3.7

Note: Table cells include the average rating given by the seven panelists for each program, for each attribute, in addition to an overall rating. The individual panelists’ ratings underlying these averages are not shown. In some cases, panelists’ ratings may vary widely.

Determination Stage

The determination stage is when the agencies decide (a) whether compensatory mitigation is required for project impacts, and, if so, (b) the amount of mitigation that will be required.

- Numeric Ratings
- Civil Works Program—3.3
  - Regulatory Program—3.1
  - Highway Program—3.6

Panelists’ Assessment

Overall, the ratings for the determination stage were the third highest among the five stages. This stage includes two separate decisions—whether mitigation is required and, if so, how much. The panelists felt that, in general, the guidance did a better job on the first decision than on the second.

Most panelists cited the existence of governmentwide guidance and how it contributes to determining whether mitigation is required. They indicated that this determination is aided by a clear, long-standing sequential definition of “mitigation” that requires avoidance first, then minimization of impact, and finally mitigation of unavoidable impacts. According to one panelist, however, while the governmentwide guidance provides definitions and indications of desired outcomes, the governmentwide guidance stops short of specifying exactly when or how a program should make a case-specific determination that compensatory mitigation is necessary and/or how much should be required. This panelist indicated that none of the three programs have explicit guidance for determining whether compensatory mitigation is required, and the outcome apparently is more a result of due diligence and quality of staff than quality of regulatory guidance.

Various panelists indicated that strengths of the Civil Works Program's guidance include detailed planning formulation guidance and state-of-the-art planning tools, emphasis on the ecosystem approach and the inclusion of adjacent lands, or the emphasis on resource evaluation to determine the mitigation needed. Other panelists, however, cited weaknesses in the Civil Works' guidance, including the confusion caused by considering economic tradeoffs in determining which mitigation alternative to select, the lack of currency or consistency in the information included, or the lack of assurance that the resources and functions lost by development will be replaced.

Regarding the Regulatory Program's guidance, several panelists expressed favorable comments regarding the program's new October 2001 guidance as it strengthens the importance of watershed context and functionality of impacted areas in decision making, emphasizes an ecosystem approach, integrates financial requirements into the permit, recognizes the need for adaptive management, better explains the criteria for determining compensation ratios, provides a more specific mechanism for determining exactly how much mitigation will be required, or details success criteria. Other panelists cited weaknesses, however, including that the detailed guidance was not adequately summarized and presented for ease of use, the guidance placed too much discretion at the Corps' district level for decisions, it lacked currency or consistency in materials, or the new guidance conflicts with other Regulatory guidance on the issue of preservation.

Panelists identified some strengths and weaknesses of the Highway Program's guidance. Among the strengths cited, panelists indicated that the guidance appropriately emphasized aquatic resources and other habitats with unique or important values under federal law, incorporated ratio goals for wetlands replacement that were considered noteworthy, was more current than the other two programs because of the emphasis on using consolidated mitigation sites in the form of mitigation banks when appropriate, emphasized resource evaluation to determine mitigation need, more effectively conveyed the information necessary to fully understand the process for determining whether compensatory mitigation is required, more effectively called for a compensatory mitigation ratio of 1.5 to 1, or included the preference to fund and then monitor mitigation banks as a means of ensuring the long-term success of the mitigation to increase ecosystem viability. One panelist emphasized the strengths of the Highway Program's guidance by indicating that it, in sharp contrast to the Corps' guidance, is clear, concise, summarized in an understandable way, and makes it clear who has what responsibilities.

Further, the panelist said that the guidance applies to a range of systems and addresses wetlands and other habitats in an appropriate manner and makes it clear that mitigation is required and that it will be done as compared to the Corps where it leaves it open. Two panelists, however, indicated that the Highway Program's guidance in this stage was weak because it did not really focus on determining the need for or amount of mitigation required.

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## Design Stage

The design stage includes all preconstruction activities once the decision on the need and extent of compensatory mitigation has been made. It includes the necessary features and performance characteristics of the mitigation project.

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## Numeric Ratings

- Civil Works Program—3.4
- Regulatory Program—3.6
- Highway Program—3.7

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## Panelists' Assessment

Overall, the ratings for the design stage were the second highest among the five stages, but panelists provided relatively little narrative comments about this stage. As one panelist pointed out, the design stage is considered more a technical element of mitigation and not as subject to policy guidance as are other stages such as the determination and evaluation stages. Panelists' generalized comments related to the *Wetlands Engineering Handbook* and included both strengths and weaknesses. Specifically, some panelists believed that the handbook includes detailed background on wetlands and statistical evaluation techniques; is relatively complete, reasonably current, and very clear; or as one panelist put it, the handbook provides very good technical information on the design, construction, and monitoring of wetland ecosystems. According to the panelist, the information is timeless and remains a standard in the field of mitigation. Yet, other panelists cited weaknesses with the same handbook. Namely, one panelist said that it does not provide a comprehensive explanation of how to design a replacement wetland and puts emphasis only on one technique to evaluate functions, even though the technique has been criticized by wetlands professionals. The panelist further stated that the handbook is very complicated to follow with its overemphasis on statistical techniques over basic design procedures. Another panelist criticized the handbook as addressing the structural aspects of viability

but paying little attention to long-term habitat function. Panelists pointed out that the guidance at this stage was weak in the areas of non-wetland fish and wildlife and upland mitigation, such as open waters, streams, stream banks and uplands, and in fact, the guidance was heavily focused on wetland mitigation.

Regarding the Civil Works Program's guidance, two panelists commented on the strength of the guidance. One panelist indicated that the guidance generally includes a relatively complete description of the parameters needed to design a successful and effective wetlands mitigation project and has sufficient criteria on uplands, land use, and other offsite factors. Another panelist said the guidance has enough information related to policy that is pertinent in the selection of the conceptual design; and case studies that are informative and provide constructive insight in applying the principles and techniques to other types of mitigation work. Three panelists, however, cited weaknesses in the Corps' guidance for this stage. Among the weaknesses cited were that practitioners will need more specific technical guidance because the guidance addresses various administrative attributes of the process rather than the mitigation aspects of projects; the guidance includes a few examples of projects but should include more and the examples should be discussed in greater detail; the guidance sets out how the design criteria should be applied, but is sometimes confusing and overly complex in its presentation; or the guidance lacks specific technical information other than to address simple hydrology and soil factors.

Two panelists commented about the Regulatory Program's new guidance when reflecting on this stage. One panelist indicated that the new guidance strengthened existing guidance by emphasizing the need to integrate buffer zone design into the plans. Another panelist indicated that the new approach cited in the guidance potentially provides a better mechanism for designing a successful replacement project; that the new guidance begins to set out the user-friendly, step-by-step set of instructions that previously had been missing; and that the new guidance makes the design stage guidance clearer and broader in at least some respects and clarifies some of the previous vagueness. While basically complimenting the new guidance, however, this panelist indicated that in other respects, the new guidance is not an improvement because it provides more flexibility than it should—for example, awarding credits for preservation—that does not serve to fulfill the goal of replacing lost functions and values.

Panelists cited some strengths in the Highway Program’s guidance for this stage. One panelist for example, indicated that the guidance was the most complete, current and clear guidance on the design of mitigation projects, although it tended to include too much emphasis on wetland banking. Further, this panelist indicated that the guidance provides excellent detail and good examples of the design stage, offers several alternative methods to assess wetland functions, and provides an excellent tool for learning how to design and construct wetland replacement projects. Another panelist indicated that while the guidance primarily relates to wetlands, it is very user-friendly both in information and format; the overall process is clear, logical, and comprehensive; from a viability perspective, the guidance is more effective because it links the need to replace lost functions at each step in the process; and the discussion on applying a cost analysis is more instructive and easier to apply than the Corps’ guidance. Yet, this panelist also indicated that the guidance suffers from the absence of information gained and lessons learned over the last 5 years and that some of the guidance conflicts with other documents. Finally, a third panelist indicated that the guidance provided good information to help in developing mitigation designs, promoted site analysis, and included sound and consistent logic for investigating site characteristics needed for sustaining wetlands. However, this panelist also indicated that information on evaluating mitigation designs, technical guidance, and standards for measuring success is missing.

Construction Stage	The construction stage includes land acquisition as well as all activity on the site until the mitigation project is turned over to the nonfederal sponsor. Construction activities include building structures, creating habitat, and introducing animal and plant material.
Numeric Ratings	<ul style="list-style-type: none"><li>• Civil Works Program—3.6</li><li>• Regulatory Program—3.7</li><li>• Highway Program—4.1</li></ul>
Panelists’ Assessment	Overall, the ratings for the construction stage were the highest among the five stages. In general, the two key technical guidance documents—the Corps of Engineers’ <i>Wetlands Engineering Handbook</i> and the Transportation Resources Board’s <i>Guidelines for the Development of Wetland Replacement Areas</i> —received compliments from the panel. In particular, one panelist indicated that although these guides address primarily wetlands, the two documents together provide a significant body

of technical information. Another panelist indicated that the guidance is relatively current and on target with the best professional knowledge in the area of wetland replacement construction. Further, this panelist indicated that the guidance provides good, specific information on a broad range of features including construction of water control structures, soils, how to ensure proper hydrology, and the sequence of construction. However, this panelist pointed out that the guidance does not discuss what happens after construction or how to do site acquisition.

Where panelists commented extensively about the *Wetlands Engineering Handbook*, very few additional comments about the strengths and weaknesses of the Civil Works Program's guidance were given. One panelist did indicate, however, that the overall materials are not always current with appropriate techniques, while another panelist pointed out that the guidance lacks information about buildability and constructive construction and that the *Planning Guidance Notebook* lacks helpful information other than rough guidelines on timing.

Panelists generally limited their comments about the Regulatory Program's guidance. Two panelists commented on the program's new guidance. Specifically, one panelist indicated that the new guidance added information related to the timing in the construction stage. Another panelist indicated that the new guidance potentially provides an effective mechanism for guiding the design and construction of a mitigation project with the analysis set forth in an organized set of procedures for guiding construction steps. In addition, this panelist indicated that the new guidance goes a long way toward establishing performance standards. In considering the Regulatory Program's guidance, this panelist indicated that the amount of information was overwhelming and unnecessary unless it is meant to serve as a general primer to anyone with marginal expertise on how to create or restore a wetland. Further, this panelist indicated that "its use as a resource tool is limited because too much information must be digested in order to get an answer or specific guidance."

Regarding the Highway Program's guidance, one panelist indicated that the program has superior guidance because of the *Guidelines for the Development of Wetland Replacement Areas*. According to the panelist, this document provides additional specifications and step-by-step guidance on wetland construction, over and above the relatively comprehensive construction details provided in the *Wetlands Engineering Handbook*. Another panelist indicated that the guidance is clear and well organized and specifically lists project construction techniques that work and those that have not. The panelist further indicated that the guidance

provides an excellent list of plants that have been incorporated in successful compensatory mitigation sites. Finally, a third panelist indicated that the Highway Program's guidance, as it does in all stages, makes it clear that competent professional decisions by experienced personnel will be used to answer questions and that this is not open to negotiations. Additionally, this panelist indicated that the Highway Program's guidance is strong in all categories and easily understood.

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## Monitoring Stage

The monitoring stage includes periodic assessments of the mitigation site before, during, and after construction. A monitoring plan establishes the requirements for the periodic assessments, the extent of federal agency responsibility, and the applicability to others involved in the mitigation project.

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## Numeric Ratings

- Civil Works Program—3.1
- Regulatory Program—3.0
- Highway Program—3.6

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## Panelists' Assessment

Overall, the ratings for the monitoring stage were the second lowest among the five stages. This rating reflects the panel's general opinion that the guidance emphasizes the determination stage and to a lesser extent the other earlier stages of mitigation at the expense of the monitoring and evaluation stages. Yet, panelists indicated that overall, the guidance material addressing monitoring was reasonably well developed, and that since the programs use the same basic reference material, they do a fairly good job at addressing the issue. Three panelists specifically mentioned the *Wetlands Engineering Handbook* as providing a good reference for setting performance criteria and providing methods for sampling everything from soils, hydrology, and vegetation to birds, fish, and invertebrates. Several panelists, however, pointed out that the coverage of monitoring activities fails to provide sufficient rationale or detail to encourage this critical stage of the mitigation process; that the material does not require upward reporting of the results so that top agency management can monitor both project or program performance with regard to the degree of success of mitigation; or that no real specific guidance on site-specific design of a monitoring program exists in the guidance.

Most panelists did not comment on the strengths of the Civil Works' guidance, but several panelists noted shortcomings in the guidance. For example, one panelist mentioned that the guidance is technically sound but addresses only wetlands for the most part and is not programmatically helpful because it lacks the details on who should do what with the reports. Two other panelists indicated that the monitoring discussions focused too much on the cost considerations of monitoring, while another panelist indicated that the guidance downplays the need for monitoring and that the guidance tends to be dated.

Regarding the Regulatory Program's guidance, panelists provided limited comments. In commenting on the October 2001 guidance, three panelists indicated that it provides a stronger emphasis on the importance of monitoring, but "permanent" monitoring is not required; this guidance is more explicit that monitoring should be included as a permit condition; or it authorized the extension of the monitoring period where appropriate. Two panelists commented that the Regulatory Program's guidance on monitoring needed to be strengthened if continued effectiveness of even state-of-the-art mitigation plans were to be ensured or that the guidance has some useful components but fails to provide any type of standardized approach.

Panelists indicated that the Highway Program's technical publications give extensive treatment of monitoring as an essential element of successful mitigation; the materials were considered excellent as they were complete, relatively current, clear, and understandable; some of the information provides a very good overview of monitoring and outlines strategies for defining success; or the information is clearly presented and provides enough technical information to be informative without being too overly technical. One panelist, however, indicated that some of the guidance could be adapted to address fish and wildlife and upland habitats but does not do so, while another panelist indicated that the guidance provides an overview of what to monitor, but does not provide any additional specifics.

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## Evaluation Stage

The evaluation stage includes three elements: (1) determining the overall effectiveness and success of the mitigation project; (2) determining what to do if a project is shown by the monitoring program, or otherwise, not to be a complete success; and (3) determining the implications for improving future mitigation projects.

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Numeric Ratings

- Civil Works Program—1.9
- Regulatory Program—2.3
- Highway Program—2.7

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Panelists' Assessment

Overall, the ratings for the evaluation stage were the lowest among the five stages. Panelists considered three separate aspects of project evaluation—success of the project, capacity to take corrective action on an unsuccessful project, and ability to make changes in future projects. From a positive perspective, various panelists thought the guidance emphasized why performance criteria are needed and who is responsible for the assessment, or these panelists said the guidance contained helpful examples of performance standards. However, several panelists generally felt the guidance was weak among all three agencies. Two panelists thought the Highway Program's guidance was good, but the guidance for the Corps' two programs was not useful in any way. Panel members disagreed over whether the Corps' new Regulatory Program's guidance made significant improvements in the evaluation stage.

Regarding the Civil Works Program's guidance, various panelists identified the following as strengths of the guidance: it is current and reflects the latest technical knowledge; it talks about how to develop performance standards for a particular site; and it includes very pertinent information regarding wetland monitoring and evaluating success criteria. Various panelists cited weaknesses of the guidance in that evaluation is given short shrift, is not addressed in a useful way, or lacked much discussion on specifics. Among specific weaknesses cited by the panelists were: the guidance provides little or no encouragement or support for continuing evaluation and correction of individual Civil Works project performance deficiencies or in developing additional guidance based on lessons learned from completed projects; the guidance does not encourage Corps' offices to undertake routine or systematic evaluations of existing project performance with the intent of either identifying on-going performance deficiencies or providing "lessons learned" to assist in the planning of mitigation or other project features; the guidance includes a laundry list of factors to measure but does not require corrective actions nor does it establish a feedback mechanism; the guidance does not include impacts on natural systems in surrounding land and water areas as part of the evaluation; and the guidance does not contain much discussion on the role and responsibilities of various parties.

Regarding the strengths of the Regulatory Program's guidance, one panelist said it gives extensive technical guidance for developing evaluation criteria. Two panelists said the recent Regulatory Program's guidance enhances the evaluation stage guidance. One of those panelists said that the guidance attempts to provide more definition to the components of evaluating the effectiveness and success of mitigation, and the other panelist said that the guidance potentially provides an effective means of tracking project success. Regarding weaknesses in the Regulatory Program's guidance, various panelists said the guidance basically does not address evaluation in any useful way or continues to need strengthening with regard to the evaluation stage. According to one of these panelists, while the Corps talks about evaluation, it has "not provided any method to use such evaluation in corrective actions either on the current or future mitigation projects."

Regarding the Highway Program's guidance, various panelists identified the following strengths: it includes a recommended assessment method; it addresses fixing problems in mitigation efforts; it allows for extending the monitoring period if the project's goals have not been achieved at the completion of the established period; it provides funding for additional restoration activities if needed; it recommends maintenance for 3 to 5 years or longer to ensure the project's success; it recommends a liberal budget for expected and unexpected maintenance costs at 2 to 3 percent of budget in reserve; or it makes the effort to see that learning is incorporated into future efforts and to "fix" projects that were not successful. Two panelists, however, said that the guidance is silent in project evaluation or that evaluation is not covered in any significant degree.

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## Complete

In this assessment, panelists were to consider whether the three programs' guidance included, for example, designation of tasks and responsibilities; ranges of mitigation alternatives; examples and cross-references; discussions of quality control, feedback, and reporting; or measures of success.

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## Panelists' Assessment

For four of the five mitigation stages, panelists' average ratings for completeness were higher for the Highway Program's guidance than either of the Corps' two programs' guidance. Several panelists commented that the collective guidance emphasized wetlands replacement too heavily at the expense of considering other habitats that support fish and wildlife. One panelist reflected that while none of the programs did a good job of

defining the amount of mitigation required, the Highway Program's guidance was the most detailed, written in a user-friendly, step-by-step fashion, and the Civil Works' guidance did not provide many technical details and emphasized cost over the evaluation of success. Another panelist indicated that the Highway Program's guidance was more complete because it set forth the range of circumstances when fish and wildlife impacts should be mitigated and its evaluation guidance specifically allows for the extension of the monitoring period if the project's goals have not been achieved. In contrast, this panelist indicated that the Civil Works' guidance falls short of identifying who should do the monitoring, who should receive the monitoring reports, and who should bear the cost of additional or off-site monitoring; and finally, that the guidance does not include impacts on natural systems in surrounding land and water areas. In discussing the Corps' Regulatory Program's recently issued guidance, one panelist indicated that the new guidance enhances the existing guidance particularly in the areas of determination and evaluation as there is a new emphasis on the ecosystem approach to mitigation. The panelist further stated that the new guidance gives more criteria for determining compensation ratios and details the components of a compensatory mitigation plan and success criteria to evaluate its success.

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## Current

In this assessment, panelists were to consider whether the three programs' guidance reflected current laws and regulations and up-to-date technical knowledge.

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## Panelists' Assessment

In general, the panelists did not provide many comments related to the currency of the three programs' guidance and with the exception of the construction stage, panelists rated the currency of the guidance similarly among the three programs. One panelist specifically noted this similarity among the currency of the three programs' guidance while another panelist did not feel as if any of the programs presented a complete, current picture of the entire process of determining what type of mitigation is needed, designing and constructing the site, and then monitoring and evaluating the project's success. The panelist further indicated that all three programs rely on a basic set of policy guidance that may not be up-to-date with current thinking about wetland replacement, and the programs rely on technical guidance that is not always in tune with current thinking. Finally, another panelist indicated that none of the programs' guidance is as up-to-date as they might be on the effectiveness of mitigation efforts and that much of the material is dated, and while still conceptually good, it does not address current techniques related to

mitigation in many instances. Three panelists commented that the Regulatory Program's new guidance overall contributes to currency in that it is more in line with current technical findings by, among other things, including an ecologically based success criteria.

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## Clear

In this assessment, panelists were to consider whether the three programs' guidance was clear on duties, responsibilities, distinction between what is required and what are discretionary actions, and whether it was logically organized.

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## Panelists' Assessment

Panelists provided a lower average rating for the Civil Works Program's guidance than the Corps' Regulatory Program's guidance and the Highway Program's guidance for all five mitigation stages as it relates to clarity. One panelist indicated that the Corps' Civil Works' guidance was the clearest as it related to the detail for determining the need for mitigation, while the Highway Program's guidance was the most clear as it relates to the design of mitigation projects, and the guidance is relatively current and understandable related to the monitoring stage. Another panelist, however, indicated that the Civil Works' guidance is compromised by the less-than-clear inclusion of cost considerations, while the Highway Program's guidance includes explicit guidance on evaluation, including a recommended assessment method. Another panelist criticized the Civil Works' guidance as providing a general listing of what will be required and the procedures for making the determination, but falling short of providing a clear explanation of the process. Also, related to monitoring, this panelist said that the Civil Works' guidance does not make clear who should do the monitoring, who should receive the reports, or who bears the cost of any additional or modified monitoring. Conversely, this panelist indicated that the Highway Program's guidance more effectively conveys the information necessary to fully understand the process for determining whether compensatory mitigation is required and if so, how much. While most of the panelists indicated that the Regulatory Program's new guidance contributed to the overall clarity, one panelist indicated that the new guidance was clearer than other Regulatory guidance, but did not improve the body of material significantly and raised additional confusion. The panelist indicated that the confusion arose because certain sections of the new guidance were poorly written and difficult to interpret.

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## Broad

In this assessment, panelists were to consider whether the guidance for the three programs was broad in its subject matter coverage. Panelists

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considered the breadth of the three programs' guidance as it related to the scope of the mitigation impacts and whether hydrology, vegetation, fish and wildlife species, adjacent lands, and wetlands were addressed.

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## Panelists' Assessment

For this attribute, the panelists' average ratings were higher for the Highway Program's guidance than the Civil Works' guidance. One panelist, however, criticized all three programs' guidance as not being particularly broad because they cover only wetland habitat and not adjacent uplands and the guidance focuses more on restoration of hydrology and vegetation than direct design elements to deal with the loss of fish and wildlife species. This same panelist indicated that two of the guidance documents provide good specific information on a broad range of features, including construction of water control structures, soils, how to ensure proper hydrology, and the sequencing of construction. One panelist indicated that the Corps' Regulatory Program's new guidance better explains when off-site mitigation is appropriate and that it ensures that the compensatory mitigation project will include design elements that deal with the entire ecosystem.

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## Viable

In this assessment, panelists were to consider whether the guidance for the three programs presents sufficient information to best ensure the success of the project. Panelists considered whether the guidance addressed the long-term viability of the ecosystem, for example the survivability of natural and man-made systems into the future.

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## Panelists' Assessment

Assessing the viability attribute resulted in the widest variance in the ratings among the panelists. For two stages—determination and evaluation—most of the panelists rated the Civil Works Program's guidance lower than the Highway Program's guidance. For two other stages—design and monitoring—most panelists rated the two programs' guidance the same. For the remaining stage—construction—an equal number of panelists rated the Civil Works Program's guidance the same as or lower than the Highway Program's guidance. One panelist indicated that the guidance for the evaluation stage for all three programs does not provide confidence that completed projects will successfully meet their performance objectives. Panelists' narrative comments generally did not include comments for weaknesses in the Civil Works' guidance and strengths in the Highway Program's guidance. One panelist, however, criticized the Civil Works' guidance because it contained no requirement to reconsider the proposed project if the compensatory mitigation project is not likely to succeed, that the information in the guidance is unlikely to

lead to the replacement of habitat losses in at least some instances, and that the guidance does not consider the impact of the mitigation project on adjacent lands. Conversely, this panelist indicated that the Highway Program’s guidance was more effective because it calls for a compensatory mitigation ratio of 1.5 to 1, it clearly states that no net loss goal applies only to wetlands, and the guidance allows funding for the establishment period to increase the likelihood of project success. One panelist indicated that the new Regulatory Program’s guidance provided more definitive instructions on how to determine mitigation ratios and types of mitigation and addressed the long-term viability of mitigation through establishing success criteria while another panelist pointed out that strengthening the financial assurances requirements also will improve a project’s chance for long-term success.

# Appendix VI: Comments from the Department of Defense



DEPARTMENT OF THE ARMY  
U.S. Army Corps of Engineers  
WASHINGTON, D.C. 20314-1000

REPLY TO  
ATTENTION OF:

CEIR

MAY 06 2002

MEMORANDUM FOR DIRECTOR, NATURAL RESOURCES AND  
ENVIRONMENT, ATTN: MR. BARRY T. HILL  
441 G STREET, N.W., WASHINGTON, D.C. 20548

SUBJECT: GAO Draft Report on Scientific Panel's Assessment of Fish and Wildlife  
Mitigation Guidance -- RESPONSE

Attached is the official USACE response to subject GAO audit. The point of contact for  
this action is Ms. Pearlana Patters who can be reach at 202/761-4461.

FOR THE COMMANDER:

A handwritten signature in cursive script, reading "John E. Templeton".  
JOHN E. TEMPLETON  
Chief, Internal Review Office

## GAO REPORT ON FISH AND WILDLIFE MITIGATION

### Overall Corps of Engineers Evaluation of the Report

The Corps was pleased to note that the results of the investigation has shown that the Corps has met the mitigation requirements established in section 906 of the Water Resources Development Act (WRDA) of 1986. Section 906 of WRDA 1986 established the requirement for mitigation to be done either prior to the construction or concurrent with construction. Appendix II of the GAO report shows that only three projects that require mitigation and are in construction, have yet to begin mitigation activities. Mitigation for the three remaining projects is scheduled for later in the construction sequence since site conditions do not allow an earlier accomplishment.

While GAO's intent was to look at comparable programs, the three programs (Corps' Civil Works and Regulatory programs and the Federal Highway Administration's program) selected have certain differences that make them difficult to truly compare. While all three programs are nationwide and at times impact similar habitats, that is where their similarity ends. The two Corps programs are primarily water resource development oriented, while the Federal Highway Administration (FHWA) program is oriented to building highways across all resource types. Both the FHWA and the Corps Civil Works programs operate on a much longer timeline than the Corps Regulatory program. The Corps Regulatory program has a goal of issuing a standard permit in 120 days (Nationwide permits in 30 days) while the Corps Civil Works planning horizon is about three years. The Corps' Regulatory program is charged with evaluating applications from a broad spectrum of applicants. The activities being evaluated are generally on a much smaller scale and rarely approach the scope of the Corps Civil Works program. The Corps regulatory program in fact, is a participating agency in the FHWA NEPA process for evaluating Federal-aid highway projects by the States. The Corps' Civil Works program is cost shared with a non-Federal sponsor and is line item authorized and appropriated by Congress. The Regulatory program evaluates proposals whose costs are borne by the applicant. The FHWA's program is a Federal-aid program to the states and is not subject to the same constraints brought to bear in a cost shared or regulatory program. Finally, the FHWA's program does not approach the complexity of the Corps Civil Works program. Basically the FHWA's program deals with aspects of building highways which means each project is similar to others in the program, while the Corps Civil Works program has a greater variety of projects. The Corps Civil Works program includes a variety of projects designed for flood damage reduction projects, hurricane and storm damage projects, navigation projects, hydropower projects, recreation projects, and ecosystem restoration projects.

### Civil Works Comments on Findings

One of the points that was brought out by the GAO panelists a number of times was that they preferred the FHWA approach to mitigation “because it calls for a compensation ratio greater than 1 to 1, and is more professionally presented as it allows for exercising professional judgement.” While this certainly simplifies mitigation planning, it raises concerns with the adequacy of the mitigation. A required mitigation ratio does not assure that the impacts were mitigated. For example, highly productive wetland habitat could be lost and the proposed mitigation could be marginal wetland habitat and even at a ratio of 1.5 to 1 this would be inadequate mitigation. This is one reason the U.S. Fish and Wildlife mitigation policy opposes ratios in favor of basing mitigation on calculated values. The Corps uses a habitat based evaluation to calculate values and functions to determine appropriate mitigation. The goal of mitigation should be to replace those values for a variety of functions. These are then used to calculate an appropriate amount of mitigation necessary and should not be artificially constrained by a mitigation ratio.

The GAO panelists placed great emphasis on professional judgement of qualified professionals (FHWA approach) rather than relying on written information that would guide the “amateur” through the mitigation process (Corps approach). The GAO panelist may have missed some salient points with regard to the Corps Civil Works mitigation planning. While the Corps guidance is written at a level that allows an amateur to comprehend the process, it is not intended that the mitigation planning will be done by amateurs or even by the Corps alone. In the Corps Civil Works program mitigation planning is a joint effort among the Corps, U.S. Fish and Wildlife Service, and the state natural resources agencies. This nationally consistent approach brings to bear both the best professional expertise on calculating values and functions lost and the best methods of mitigating the losses combined with a local knowledge of the habitats to be impacted.

A criticism, by GAO panelists, of all the programs reviewed was that “none of the three programs have explicit guidance for determining whether compensatory mitigation is required and the outcome apparently is more a result of due diligence and quality of staff than quality of regulatory guidance.” From a Corps Civil Works standpoint, there can be no definitive guidance that would apply to all circumstances when mitigation is required. There are no statutory requirements mandating mitigation, even the National Environmental Policy Act does not require mitigation, but only requires that mitigation be considered during the decision making process. Not all impacts require mitigation, for example the simple act of mowing a lawn causes impacts to grass, but there is no proposal to mitigate those impacts because they are not significant. However, if there are impacts to bottomland hardwoods then mitigation is not only considered, but the mitigation goal is to mitigate the losses in-kind. The Corps Civil Works program produces a wide array of projects in size, scope, and purpose; therefore mitigation planning must be of a scope to allow the necessary flexibility in determining if mitigation is necessary and then how much is required to offset the impacts. For example, while the Corps’ Civil Works program may include compensatory fish and wildlife mitigation for impacts of a flood control project, it is not likely to include compensatory mitigation for a project whose purpose is ecosystem restoration. In fact, the Corps Civil Works policy is that if an ecosystem restoration project requires fish and wildlife mitigation, then the

project should be evaluated to determine whether it is appropriate because there should be no fish and wildlife mitigation required for an appropriate ecosystem restoration project.

With regard to the Corps Civil Works program reliance on the Economic and Environmental Principle and Guidelines for Water Related Land Resources Implementation Studies (P&G), this is not by choice but by presidential direction. The Corps Civil Works program has developed its environmental planning guidance based on the P&G because the document signed by the President directed all Federal Agencies involved in water resources planning to use the P&G. The P&G guidance was developed in response to the requirement of the Water Resources Planning Act, as amended.

One of the points that the GAO panelists split on concerned the Corps Civil Works guidance with regard to habitats other than wetlands. The Corps has extensive information for evaluation and design of all kinds of habitat. The Corps has several research institutions (e.g., Environmental Laboratory (formerly part of what was known as Waterways Experiment Station), Cold Regions Research Laboratory, Construction Engineering Research Laboratory) whose function is to find better ways of accomplishing the Corps mission, which includes fish and wildlife mitigation. These efforts are not restricted to just wetlands, but includes a full range of habitat types. These institutions have a long history in these efforts and are available to districts as support organizations. For example, the Environmental Laboratory has a program where if a district needs help on a particular issue, the laboratory provides three days at no cost to help define and/or resolve the problem. If that is not enough, the Environmental Laboratory can be contracted to bring their expertise to bear on a given project.

One of the major criticisms of the Corps Civil Works program was that there is not enough encouragement or support for continuing long-term evaluation and correction of mitigation problems on individual Civil Works projects. One of the Corps Civil Works program's goals is to ensure adequate fish and wildlife mitigation for its projects. The best way to ensure adequate mitigation is to use proven successful techniques. If proven techniques are used then only shorter term monitoring is necessary to assure the mitigation is on track. For those instances, where there is more uncertainty, then longer-term monitoring and adaptive management techniques are included. The Corps Civil Works program is both line item funded and cost shared with a non-Federal sponsor. Hence, there is no continuing general fund to draw upon for follow up on mitigation. Short-term monitoring and adaptive management is cost shared, while long-term efforts are part of operation and maintenance and are therefore usually a 100 percent non-Federal responsibility. For the Corps' Civil Works program to participate in a long-term monitoring and/or adaptive management effort, it would have to be included in the original project planning report, authorized by Congress. In addition, Congress would have to provide a specific appropriation for the monitoring/adaptive management or the Corps would have to keep the project construction account open for the length of time specified, which would preclude closing the construction account which could lead to the non-Federal sponsor not getting reimbursed for project participation for many years. This is why the Corps has a program, Section 216 of the Flood Control Act of 1970, that

allows the Corps to become involved again with a project should it be determined that further efforts are necessary to achieve the environmental mitigation needed.

#### **Regulatory Comments on Findings**

The GAO report criticized the Corps' regulatory guidance for its emphasis on the early determination and design stages of mitigation projects to the detriment of the evaluation and monitoring stages. The Corps Regulatory program considers the early determination and design stages as the most critical stages for most mitigation projects. Past evaluations of completed mitigation projects indicated those that are unsatisfactory resulted primarily from lack of attention to planning factors, i.e., site selection and project design. Most Corps research has therefore been related to those factors and mitigation policy reflects the results from those investigations.

The policies in the Regulatory program are for the most part directed at the Federal project manager making the evaluation and the decision concerning a permit. Permit applicants are provided information that will facilitate their compliance with the requirements of those policies, but are left for the most part to be independent decision makers concerning the timing of decisions and the financing of their proposal. Corps decision making timeframes in the program are directed at being public oriented and timely. Timeliness is related in some ways to the environmental complexity of the effects of the proposal, and ranges from automatic to a year. Therefore policies formulated concerning mitigation must take time into consideration. Corps regulatory policies tend to be a combination of cookbook practice, mixed with flexibility for professional judgment, where the regulated party does the decision-making. After action monitoring on mitigation sites is a permittee responsibility, required as a condition in the permit. Monitoring reports are required to be submitted for evaluation on a periodic basis. This results in a more efficient program.

The GAO report stated that the Corps of Engineers' Regulatory program emphasizes wetlands to the detriment of uplands or adjacent lands. The Regulatory program was initially established to oversee development in navigable waterways. The regulation of impacts in wetlands came about as a result of Section 404 of the Clean Water Act (CWA). Wetlands were recognized as a resource in decline early on during the implementation of the CWA. Since 1990, the Corps regulatory program has been pursuing a Presidentially established interim National goal of no overall net loss of wetlands. This goal will most likely remain in affect until other local state and Federal programs begin to provide significant increases in the Nation's wetland base. Thus, most of the emphasis and resulting guidance has been on wetlands compensatory mitigation.

A perceived deficiency noted by the GAO report is that the Regulatory program fails to require corrective actions in those instances where projects do not succeed. The Regulatory program defines success with regard to wetlands mitigation based on conditions in the permit. Corrective actions can only be required to the degree there are measurable standards in the permit. The report indicated a success should be defined in terms of ensuring that mitigation projects were providing "ecological success."

Currently, there are no defined, measurable criteria, about "ecological success," for the Corps regulatory program to rely upon. This is one reason for the National goal statement including the word "overall."

The Regulatory program was criticized in the GAO report as lacking the details and performance measures to truly advance wetlands protections. As indicated in the previous discussions concerning compensatory mitigation success, there is no detailed set of criteria that fit the requirement. Advancing wetlands protection is not done through a "one size fits all" program. The resource base (wetlands) varies as a result of climate, landscape conditions and human resource conditions. Decisions concerning what resources to protect and how to protect them must be made at the local level. National guidance must be flexible enough to provide opportunities for local solutions.

The GAO report's characterization of the Regulatory program as needing strengthening on monitoring and evaluation activities is noted, but should be looked at in context of the overall Regulatory program. Monitoring and evaluation for compliance is the number one priority for the Corps regulatory enforcement program. None-the-less, there will always be criticism from those that do not see the benefits that accrue from requiring mitigation monitoring reports to be submitted to the Corps, rather than having Corps personnel actually inspect the mitigation project. Individual inspections are difficult to carry out with the current work force constraints in the program.

The GAO report characterized Regulatory program guidance as lacking sufficient specifics on how much and what type of mitigation is needed and what functions should be replaced. In particular the GAO report appears to not have understood that specifics were not included in the Regulatory Guidance Letter because it was developed as a general guidance document. Specifics concerning the comparison of authorized impacts to required compensatory mitigation are contained in methodologies developed for that purpose. While there are a number of those methodologies that have been developed to satisfy local and regional needs, none have been adopted as national standards for the regulatory program. Concern about effectiveness, suitability, cost and other logistical considerations have precluded the Corps from taking a "one size fits all" approach.

The GAO report notes that the Regulatory guidance allows credit for efforts taken in uplands, which means that wetlands functions and values will not be replaced in those situations. While it may seem that this allows wetlands to be traded off in favor of uplands, there are reasons why this flexibility has been provided. Aquatic resource mitigation sites, particularly those directed at wetlands, require protection from encroachment in order for the site to be viable. In an ideal circumstance a wetland would be surrounded by undisturbed uplands, thus minimizing unwanted impacts from outside the aquatic reach. However, this is not the case for most mitigation sites. When a wetland is impacted, usually the surrounding uplands are impacted as well. Those impacts occur without regulation under the Clean Water Act. Requiring a permittee to provide an upland buffer around a wetland mitigation site results in protection for the aquatic resource. Without a policy allowing some credit to accrue for that upland buffer

there is no justification for the requirement, and protection would be lost, making the wetland mitigation less viable.

Finally, the GAO report suggests that in the Regulatory program there continues to be a real absence of guidance on the minimum requirements of a conceptual mitigation plan. The perceived absence of guidance concerning requirements reflects the difficulty in developing minimum standards that are acceptable in every circumstance. Therefore, the Regulatory program has provided general guidance concerning the evaluation of mitigation plans, and their content. The regulator must exercise some judgment based on experience and training to determine if a plan is adequate to provide appropriate compensatory mitigation.

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# Appendix VII: Panel of Scientific Experts, Technical Adviser, and Expert Reviewers

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## Panel of Scientific Experts

Robert P. Brooks, Ph.D.  
Director, Penn State Cooperative Wetlands Center and Professor of  
Wildlife and Wetlands, Penn State University

G. Edward Dickey, Ph.D.  
Senior Adviser, Dawson and Associates and Cassidy and Associates

Ellen Gilinsky, Ph.D.  
Manager, Virginia Water Protection Permit Program, Virginia Department  
of Environmental Quality

Carl Hershner, Ph.D.  
Director, Center for Coastal Resources Management, and Associate  
Professor, School of Marine Science, Virginia Institute of Marine Science

Robert G. Hoyt, Esq.  
Principal and Founding Partner, EcoLogix Group, Inc.

Alan Wentz, Ph.D.  
Group Manager for Conservation Programs, Ducks Unlimited, Inc.

David Yam, Branch Chief  
Erosion and Sediment Control Branch, California Department of  
Transportation, Office of Landscape Architecture District 4

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## Technical Adviser

William Matuszeski, Esq.  
Former Director, Chesapeake Bay Program, Environmental Protection  
Agency

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## Expert Reviewers

Russell J. Bellmer, Ph.D.  
Marine Ecologist, National Oceanographic and Atmospheric  
Administration Restoration Center

Thomas Kelsch, Director  
Mid-Atlantic Region, National Fish and Wildlife Foundation

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# Appendix VIII: GAO Contact and Staff Acknowledgments

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## GAO Contact

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## Acknowledgments

In addition to the above, Nancy S. Bowser, James M. Fields, H. Brandon Haller, and Rosellen McCarthy made key contributions to this report.

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